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ABSTRACT

This paper surveys the recent literature on the implementation of educational innovations and reviews and synthesizes research findings and recommendations for improving educational practices. It focuses on the implementation processes, influences, and effects that are considered to be important variables in educational change, and explores patterns of interaction between external agencies and local school personnel engaged in implementing innovations. The major section of the paper includes a discussion of trends in research on educational implementation. It reviews six models of the change process and presents case studies illustrating these models. It also discusses barriers and facilitators influencing the planning and implementation of innovations, and describes the roles of internal and external groups and individuals involved in these processes. The summary and conclusions section emphasizes that the processes of planning and implementation--including communication, training, and assistance--require systematic attention in order to ensure project effectiveness. Finally, it is suggested that greater use should be made of research findings and that collaboration between internal and external groups and coordination of resources are desirable and probably necessary for the effective implementation of educational innovations. (Author/JM)

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IMPLEMENTATION OF INNOVATIONS IN EDUCATIONAL ORGANIZATION AND INSTRUCTION

Jane M. E. Roberts
Research for Better Schools, Inc.

Working Paper June 26, 1978

ABSTRACT

This paper surveys the recent literature on implementation of educational innovations, reviewing and synthesizing research findings and recommendations for improving educational practices. It focuses on the implementation processes, influences, and effects that are considered to be important variables in educational change, and explores patterns of interaction between external agencies and local school personnel engaged in implementing innovations. The major section of the paper includes a discussion of trends in research on educational implementation. It reviews six models of the change process and presents case studies illustrating these models. It also discusses barriers and facilitators influencing the planning and implementation of innovations, and describes the roles of internal and external groups and individuals involved in these processes. The summary and conclusions section emphasizes that the processes of planning and implementation--including communication, training, and assistance--require systematic attention in order to ensure project effectiveness. Finally, it is suggested that greater use should be made of research findings, that collaboration between internal and external groups and coordination of resources are desirable and probably necessary for effective implementation of educational innovations.

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INTRODUCTION

This paper describes models, studies, and research findings related to the implementation of innovations in educational organization and instruction, and discusses implications of recent research for those involved in efforts for school improvement. The paper is intended to inform and guide those who are unfamiliar with the literature and who may need to understand the processes, influences, and effects considered to be important variables in the implementation of educational innovations.

Certain perspectives based on recent research and practice influence the content and organization of the paper. These perspectives are:

- Fuller utilization of tested research and development (R&D) outcomes by local schools is needed;
- Educational practitioners can improve their capabilities in school improvement by employing principles and processes of effective implementation;
- The findings of recent studies of implementation may guide the ways in which collaborative efforts for school improvement are conducted by external agencies and educational organizations.

The contents of this paper, without claiming to be comprehensive, should be sufficiently representative of the field to provide useful information to those involved in school improvement efforts. Throughout the paper it is emphasized that employing research findings on implementation requires taking full account of factors in the local situation and the active participation of local personnel in designing as well as conducting change programs.

The literature review on which the paper is based included study of immediately available materials, an ERIC search using key descriptors, a citation search based on bibliographies, and an author search via the Current Index to Journals in Education. Little attention was paid to documents published before 1970.

While this paper's chief focus is on studies of implementation, it also includes a review of models and studies dealing with the entire process of selecting, planning, and conducting local change programs.

REVIEW AND SYNTHESIS OF RESEARCH

This section of the paper includes eight parts: (1) trends in the study of implementation of innovations, (2) models of educational change, (3) review of seven studies of implementation, (4) cross-study synthesis of findings, (5) barriers and facilitators influencing innovations, (6) barriers and facilitators influencing implementation, (7) roles and responsibilities of internal individuals and groups involved in educational change, and (8) roles and responsibilities of external individuals and groups involved in educational change.

Throughout this section, three dimensions of change weave through the discussion: processes, influences, and effects. Processes include activities and modes of communication. Influences include the roles and responsibilities of individuals and groups internal and external to the educational organization undergoing change, and the nature and source of the innovation. Effects include the outcomes of the implementation of the innovation, such as student achievement results, internal changes in organization and instruction, and nature and extent of adoption.

Trends in the Study of Implementation of Innovations

Gradually, the focus of studies has shifted away from what happens after an innovation is used, and toward what happens while the innovation is introduced and implemented. The discussion that follows illustrates this pattern of change.

During the early 1960's investigators tended to focus on the final outcomes of innovations. Questions most frequently asked related to the extent of improvement resulting from an innovation, and to the extent of adoption of the innovation. When results were analyzed, it was frequently found that a given innovation could have varying results, and that even when an innovation appeared to be generally successful, it was not necessarily widely adopted.

Later some researchers began to explore the processes and influences relating to educational change. At first, attention was focused on diffusion and adoption. Gradually, investigators began to pay more attention to the actual use of an innovation, attempting to determine whether or not the innovation was implemented as planned or as specified by the developer: the degree of implementation was studied. More recently, attention has been paid to the processes of planning and implementation, and the influences operating before and during those processes.

Focus on Outcomes and Adoption

Most major innovations, and studies related to those innovations, have been dominated by such models of change as the Research, Development, Diffusion, Adoption Model (RDDA), proposed by Brickell in 1961 and refined by Clark and Guba in 1967, and the Social Interaction Model, described by Rogers in 1962, both of which focus on diffusion and adoption of an innovation. Goodwin (1977, p. 111) argues that the use of these and similar models was based upon the assumption that rational behavior

would prevail in school systems, resulting in the selection and adoption of meritorious innovations generated by R&D.

In order to determine, and possibly validate, the relative merit of an innovation, studies were conducted, usually designed to assess program effectiveness. When implementation was not studied, or when it was given only cursory attention, the outcomes of an innovation were frequently determined by comparing achievement scores of "experimental" and "control" groups. However, since the nature of implementation (i.e., the way in which each user interprets and uses the innovation) may vary considerably, and since it is possible that some components of an innovation may be used with "control" groups as well as with "experimental" groups, reports of "no significant differences" were not uncommon, and may well have been meaningless, not only to the researcher, but also to the practitioner who was trying to decide whether or not to adopt an innovation (Goodwin, 1977, p. 110; Gross, Giacquinta & Bernstein, 1971, p. 35; Hall & Loucks, 1977; Heathers, 1972). As Charters and Jones point out (1975), without measurement of implementation "evaluation studies may end up appraising nonevents, with no one the wiser."

When it was believed that an innovation was meritorious, either because of empirical data or through consensus of "expert" opinion, the assumption was made that the innovation would be adopted (Gross et al., 1971, p. 22; Ohme, 1977). Much research focused on the adoption process and the characteristics of schools and educational organizations that did or did not adopt innovations. In general, findings indicated that

the hoped-for widespread adoption did not occur. For a variety of reasons the assumptions that practitioners will behave rationally, and that improvement will necessarily follow from application of relevant research are no longer viable (Short, 1973).

Factors influencing the relative failure in widespread adoption of innovations are numerous and diverse. Futurists (e.g., Cornish et al., 1977, ch. 1; Kauffman, 1977, ch. 4; Toffler, 1974, ch. 1) point to the accelerating rapidity of change and the "knowledge explosion," arguing that many people cannot keep up and therefore prefer to retain the security of the status quo rather than risk something new. Sociologists and those in related fields (e.g., Firestone, 1977; Heathers, Roberts & Weinberger, 1977, p. 3-1-3; Kirst, Note 4,) refer to social patterns of change such as the increasing demand for participation and influence in decision-making which is a double-edged sword: multi-level active participation may result in rejection of an innovation; lack of provision for participatory decision-making may result in sabotage of an innovation (Firestone, 1977). Some educational researchers (e.g., Maguire, 1970, p. 5; Short, 1973; Connolly & McGrail, Note 2) argue that practitioners have difficulty in interpreting research findings and in successfully implementing innovations, partly because of the nature of reports and the nature and demands of an innovation.

The emphasis on the study of adoption is widely discussed in the literature. Such discussions are frequently followed by the conclusion that far greater attention should be paid to the study of implementation (e.g.,

Fullan & Pomfret, 1977; Hall & Loucks, 1977; Heathers, 1972). The Rand study of Federal Programs Supporting Educational Change (Berman & McLaughlin, 1977, Vol. 7, p. 12) provides a summary of this consensus of opinion:

> Much of the social science literature focuses on the adoption of innovations and virtually ignores implementation; the implicit assumption seems to be that innovations are self-executing--that once adopted, better technologies invariably produce better outcomes...(But) implementation, not adoption, dominates the outcomes of innovative projects.

This argument, and others, led researchers away from the focus on adoption and toward a focus on implementation.

Focus on Implementation

Some investigators began to explore implementation, initially with the assumption that the innovation would remain unchanged. For instance, one of the earliest studies of implementation (Gross et al., 1971) defines the degree of implementation as:

> the extent to which organizational members have changed their behavior so that it is congruent with the behavior patterns required by the innovation. (p. 16)

This expectation of conformity by practitioners prevailed in the literature and in RDDA projects for a number of years. The idea was that an innovation was designed, developed, tested, and revised by an individual or group outside the school, and then offered to practitioners who were expected to use it exactly as it was; the practitioners should conform to

the design, changing their own behaviors if necessary but not changing the innovation. Therefore, when implementation was measured, evaluators held the fidelity perspective, determining the "degree of implementation of an innovation in terms of the extent to which actual use of the innovation corresponds to intended or planned use" (Fullan & Pomfret, 1977).

Until recently, the fidelity perspective continued to dominate the study of implementation. However, this is changing. Kritek (1976) states that "in the last four or five years researchers have begun to pay explicit attention to the implementation process," and Fullan and Pomfret (1977) suggest four reasons why implementation should be studied. These reasons are: (1) that which has changed must be measured, (2) understanding of possible reasons for failure of innovations is necessary, (3) student outcomes must be interpreted and related to determinants of implementation, and (4) failure to measure implementation may result in confusion.

If implementation is so important, why has it been ignored? Answers may be inferred from some reports (e.g., Gross et al., 1971; Heathers, 1972), which suggest that in order for implementation to occur to a high degree of fidelity, factors of process and influence need to be tightly controlled, and that such control was not anticipated until after the innovation had been introduced. Thus, only after studies had been conducted did it become apparent that attention should have been given to the implementation of an innovation. Implementation may have been ignored because researchers had not anticipated its importance, or because it was assumed that practitioners could and would adher to external guidelines.

Goodwin (1977, p. 119) suggests other reasons for the lack of study of implementation:

> It is costly and time-consuming . . . not of primary interest to those who might fund such research . . . does not promise to yield short-term visible results to federal funding agencies.

Hall & Loucks (1977) argue that implementation can be measured in a cost-feasible manner, and since their research and the research reported by Berman et al. (1977) is supported by federal funds, Goodwin's arguments may no longer be valid. Regardless of the barriers, such as cost, current research appears to place greater emphasis on implementation and the processes and influences affecting it.

Measurement of Implementation

It is important to differentiate between measurement of implementation and measurement of program effectiveness. The pattern of change in the focus of research studies indicates that the latter examines the extent of improvement, e.g., student achievement, and extent of adoption. Measurement of implementation does not necessarily exclude examination of improvement and adoption, but the emphasis is placed more heavily on examination of other effects. Effects of implementation that may be studied include:

- Goal congruence: the extent to which implementation is congruent with the goals of the innovation, "protects the original vision, (does) not betray it or abandon it" (Miles, Note 5).

- Problem-coping ability: the extent to which those involved are able to cope with unanticipated problems during and after implementation so that the problems "stay solved, don't recur" (Miles, Note 5).

- Stakeholder satisfaction: the extent to which those involved, especially practitioners, are satisfied that the innovation and the way it is implemented achieves "things important to them and their constituencies" (Miles, Note 5).

- Adaptation: the nature and extent of adaptation of the innovation and of the users (Berman et al., 1977).

- Level of use/assimilation: the extent or level to which individuals, e.g., teachers, implement the innovation (Berman et al., 1977, Vol. 7, p. 19; Hall & Loucks, 1977; Paul, 1977).

- Incorporation: the extent to which the school or district incorporates the innovation as an integrated part of the educational program or system on an on-going basis (Berman et al., 1977, Vol. 7, p. 186).

- Institutionalization: the extent to which all internal users (from classroom to district) accept and use the innovation on an on-going basis (Berman et al., 1977, Vol. 7, p. 182).

Not all studies measure the above effects, and many studies examine other factors or effects of implementation. Methods, measures, and design of studies of implementation are influenced by a variety of factors including the nature of the innovation, time and other resources available, and perspectives favored.

The nature of the innovation. The term "innovation" is variously defined in the literature. One broad definition is offered here. Zaltman and Lin (1971), citing Barnett, Bell, Robertson, and Rogers and Shoemaker, suggest that innovation is "any idea, practice or material artifact perceived to be new by the relevant unit of adoption." This definition,

focusing on the perception of the user, allows for the fact that a given practice or product may be an innovation for one person or organization, but not for another. It also points to the fact that an innovation may be material and/or abstract, and that an infinite number of innovations is possible. If this definition and its assumptions are accepted, it becomes apparent that studies of the implementation of innovations will vary according to the nature of the innovations. (For instance, an innovation consisting of packaged independent study materials designed to be "teacher-free" would probably call for a different set of study techniques from that appropriate for an innovation consisting of new teaching practices.)

Available resources. The amount of time and other resources available for the study of the implementation of an innovation necessarily influence the nature of the study. For instance, federally funded studies are more likely to be able to tap more resources than those conducted by a local school district.

Perspectives. Two common perspectives of implementation studies are: (1) fidelity--the extent to which the innovation is implemented as planned or designed, and (2) mutual adaptation--"in which the project is adapted to its institutional context and organizational patterns are adapted to meet the demands of the project" (Berman et al., Vol. 7, p.5, 1977). So far, studies have focused on one perspective, but Fullan and Pomfret (1977) suggest that the two perspectives are not necessarily mutually exclusive. Although the perspective of mutual adaptation is growing in popularity, Fullan and Pomfret argue that the fidelity

perspective may be more appropriate in certain cases. Hall and Loucks (1977) appear to favor the fidelity perspective, measuring the levels of use (LoU) of an innovation, not only in "experimental" sites, but also in "control" sites.

Methods and instruments. Reports of studies of implementation indicate the use of several methods, namely, direct observation, interviews, use of questionnaires, and analysis of key documents. Instruments are related to the methods and perspectives, and vary in content, emphasis, and degree or level of structure. Fullan and Pomfret (1977) argue that "it is probably desirable to employ more than one method in any given situation," especially since some dimensions "can be directly observed" while others "can only be inferred or determined through questioning" or through analysis of documents.

Focus of measurement. With a few exceptions, implementation is measured at the level of the primary unit of use or adoption, e.g., the teacher in the classroom. However, recent findings indicate that interaction of a number of variables influences the nature of implementation at a given level. This suggests that measurement should expand to include the secondary unit of adoption, e.g., the school, and the tertiary unit, e.g., the school system or local school district.

Interacting variables occurring before and after (as well as during) implementation have been identified in a number of studies. The researchers either report how these variables have been studied, or recommend that they should be studied. Fullan and Pomfret (1977) identify four categories of factors that are "empirically derived from the (15) studies analyzed."

The four categories are: (1) characteristics of the adopting unit, (2) strategies used, (3) characteristics of the innovation, and (4) characteristics of the macro socio-political units. The Rand study (Berman et al, 1977, Vol. 7) reports three categories: (1) federal input, (2) project characteristics, and (3) classroom and institutional setting. Paul (1977), having analyzed over 100 studies, finds three categories: (1) processes, (2) influences, and (3) effects. Charters and Jones (1975) identify four categories: (1) institutional commitment, (2) structural context of the innovation, (3) role performance of teachers, and (4) learning activities of students.

Although the terminology used in the four documents cited above varies, the intended meanings are found to be very similar when the factors within the categories are examined. A synthesis of variables influencing implementation, which can and should be measured before, during and after implementation, includes:

- Characteristics of the innovation--its sources, nature, purpose, target audience, demand on resources, explicitness, complexity, and scope of change.
- Characteristics of the planning/implementation process--the nature and extent of training, assistance, support and feedback.
- Characteristics of the internal education organization (i.e., those individuals and groups directly involved in the change experience)--the nature and extent of influence of such factors as commitment/support, climate, roles and responsibilities, use of resources, and demography and communication patterns within and among levels or units of the system.
- Major external characteristics--the nature and extent of influence of such factors as input from federal, state, or other external agency, evaluation and design demands and constraints, incentives, and socio-political complexity.

Models of Educational Change

Many models of planned educational change are discussed in the literature and have been conceptualized and analyzed in a variety of ways. Trends in predominance and use of a given model are influenced by several factors including: the relevance of the model to the problem or situation, patterns in distribution of federal funds, and the perceived importance of the roles and responsibilities of internal and external individuals and groups involved in educational change (Berman & McLaughlin, 1974, Vol. 1; Hall & Alford, 1976, p. 23). This last factor appears to be strongly influential in determining the acceptance and popularity of a model: when internal groups, i.e., practitioners, are perceived as playing a passive and rational role, certain models (such as the RDDA) dominate educational change; when internal groups are perceived as influential--playing a collaborative role--models such as Linkage or the Local Process of Change become dominant. The perceptions appear to be influenced by general social trends, and by the findings and conclusions of current studies.

A review of the literature reveals six models that are or have been strongly influential in educational change. Each is different in terms of processes, influences, and effects, although all are designed to bring about school improvement. The models are: (1) the Research, Development, Diffusion, Adoption Model (RDDA); (2) the Social Interaction Model; (3) the Problem-Solving Model; (4) the Linkage Model; (5) the Organizational Development Model (OD); and (6) the model of the Local Process of Change (LPC).

Each model is described in turn, the descriptions being based on a framework of assumptions, history, stages, processes, influences, and effects. Following the separate descriptions, a comparison of the models in terms of processes, influences, and effects is presented based on selected opinions and findings from the literature.

As stated earlier in this paper, processes include activities and modes of communication; and influences refer to the innovation and to external and internal individuals and groups. Internal groups are those within the educational organization experiencing or implementing the change. Hall and Loucks (1977) identify three internal levels, ranging from the teacher to the local school district. External groups (for the purpose of this paper) include federal and state educational agencies and agencies or individuals such as consultants, universities or R&D laboratories and centers. The term "effects" may be chosen to designate only those factors in a complex situation that may be definitely attributed to a known cause, or may be used in a more general way. For the purpose of this paper, effects of implementation of an innovation include goal congruence, stake-holder satisfaction, problem-solving capability (Miles, Note 5), level of use/assimilation (Berman et al., 1977 Vol. 7; Hall & Loucks, 1977; Paul, 1977), incorporation, institutionalization (Berman et al., 1977, Vol. 7), and student achievement (Coles & Chalupsky, Note 1).* In the following discussion of models, effects are described in general terms, with emphasis on those most commonly measured or explored by studies relating to the respective model.

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*See pages 9 and 10 of the paper for further discussion of effects.

The Research, Development, Diffusion, Adoption (RDDA) Model

The RDDA model has dominated major educational change efforts for a number of years, and is still used by such sources of innovation as publishers, colleges and universities, and some R&D agencies (Hall & Alford, 1976, pp. 20-24).

Assumptions. The model has a paternalistic approach based on the assumption that "experts" can and should plan for, rather than with, practitioners (Morrish, 1976, p. 42). Havelock and Havelock (1973, p.12) point to five assumptions guiding the application of the RDDA model: there is a rational sequence through the stages; large-scale planning is conducted over a relatively long time span; division and coordination of labor accords with the rationality and planning; a passive but rational consumer will accept the innovation; and benefits in efficiency and quality will offset high costs and be persuasive in mass audience dissemination.

History. Havelock and Havelock (1973, p. 12) state that the RDDA model was conceptualized by Brickell (1961) in his report of educational innovation in New York State, and further developed by Clark and Guba in 1967. Clark and Guba state that their "classification schema of processes," was "constructed on logical grounds and is largely unsupported by research." Paul (1977) cites Clark and Guba as the primary creators, and states that they "have claimed that their conceptualization of the change process was not intended as a model."

Stages. According to Clark and Guba (1967), RDDA has four phases which can be further subdivided into eight stages. The research phase

includes one stage--to advance knowledge to provide a basis for invention. The development phase includes two stages: (1) invention--to innovate by formulating a solution to an operating problem; and (2) design--to engineer by constructing an innovation package of solution components. The diffusion phase includes two stages: (1) dissemination--to inform by creating awareness of the invention among practitioners; and (2) demonstration--to build conviction by providing opportunity to examine the invention in operation. The adoption phase includes three stages: (1) trial--to test the invention in the context of a particular situation; (2) installation--to operationalize the invention for use in a specific institution; and (3) institutionalization--to establish the invention as an integral part of the system. Separate educational institutions may be involved for each phase (Hall & Alford, 1976, p. 20).

Processes. Research and development activities predominate in this model. The mode and pattern of communication are from the source of innovation to the practitioner, usually in written form. Extensive resources are usually tapped by the external agency, and may include the use of several thousands of dollars over a period of years for a single innovation.

Influence. The external agency, as the source of innovation, is the strongest influence, dominating the internal group, which is perceived as rational and passive. The innovation is usually predetermined by the external agency, and rarely includes provision for comprehensive on-going training of the users of the innovation (e.g., see Gross et al., 1971; Kritek, 1976).

Effects. Outcomes are usually determined by measuring the extent of improvement resulting from the innovation, and the extent of adoption. The stakeholder is the source of innovation and is satisfied if improvement results are positively significant and if adoption is widespread. Concern "with needs and dispositions of users is viewed as unnecessary and/or inappropriate" (Paul, 1977, p. 33). Adaptation of the innovation is not supposed to occur, and goal congruency should be high.

The Social Interaction Model

Since this model focuses on adoption, it is most commonly used in diffusion and dissemination efforts. It may be perceived as a continuation of the RDDA model.

Assumptions. This model assumes that research and development have been completed, and that the innovation is a whole package or process ready to be used. Havelock and Havelock (1973, p.18) discuss five generalizations about the process of innovation diffusion: the network of social relations to which a potential user belongs influences adoption behavior; the degree or rate of acceptance can be predicted by the user's place in the network; informal personal contact is strongly influential; reference group identification is a major predictor of individual adoption; the rate of diffusion follows a predictable S-curve.

History. Paul (1977) states that the work of Rodgers (1962) is associated with the development and refinement of this model, which Morrish (1976, p. 109) refers to as the rural sociology model, since it emerged from research on the diffusion of agricultural innovations.

Stages. The stages are: awareness, interest, evaluation, trial and adoption.

> This follows a certain sequence whereby a new idea is pursued by one school after having carefully observed its use in another . . . The innovation comes all of a piece to the receiver, and in consultation with others he will decide whether or not he will accept it, and to what extent. (Morrish, 1976, p. 43)

Processes. Communication is one way from those who know about the innovation to those who do not know about it. Once awareness and interest have been aroused, the activities focus on implementation of the innovation. Key resources--apart from the innovation itself--include the social network to which potential users belong, the way in which the network is used, and the methods and materials used to publicize the innovation within the network. The amount of time used varies according to the number of initial contacts made by the field agent, the length of time taken to implement the innovation, and the overall goal of the project.

Influences. The external influence is usually a field agent acting as an advocate for a complete program, and assuming that members of the internal group will behave rationally. The more effective the field agent is, the more widespread adoption is likely; the more successful the innovation, the more the field agent is likely to be effective. Thus, ideally, influence should ripple outward from the initial contact as waves ripple from a stone tossed in a pond.

Effects. Outcomes of the use of this model are commonly determined by assessing the extent of adoption within a given period of time (usually not more than five years). The greater the satisfaction with an innovation by adopters (who are not expected to initiate major adaptations of the

innovation), the greater is the likelihood of widespread adoption.

The Problem-Solving Model

Unlike the RDDA and Social Interaction models, the Problem-Solving Model does not revolve around a completed innovation, neither does it cast the internal group in a rational or passive role. Instead, this model, which is gaining in popularity, is open-ended and focuses on the needs of the internal group.

Assumptions. Havelock and Havelock (1973, p.8) stress five points of importance in this model: user need is the major consideration; diagnosis is essential to the total process; change agents should be nondirective; internal resources should be fully utilized; users will be most strongly committed to innovations that are self-initiated and self-applied.

History. According to Maguire (1970, p.15), this model was developed by Lippit, Watson, and Westley in 1958, and was influenced by work related to T-group sessions conducted at the National Training Laboratories. During its evolution, the model has also been influenced by Kurt Lewin's three phases of unfreezing, moving and freezing (Morrish, 1976, p.44).

Stages. Morrish (1976, p.112) identifies six stages of the Problem-Solving Model: (1) translation of a perceived need into a clear statement of the problem, (2) diagnosis of the problem, (3) search and retrieval of information relevant to a problem solution, (4) adaptation of an innovation selected from alternatives identified in stage three, (5) trial through installation and implementation, and (6) evaluation of the trial in terms of satisfactory solution to the original perceived need.

Processes. Communication is two-way between a change agent and the internal group, with the former providing resources and assistance to fulfill the latter's needs while the internal group provides relevant (problem topic) information to the change agent. Both parties identify and provide resources and offer feedback related to the activities within each of the stages of the model. The amount of time spent varies.

Influences. The external person or group is in the role of a consultant, guiding the internal group which is in a cooperative role.* The innovation is usually an adaptation of an innovation generated elsewhere.

Effects. The ideal outcome is the satisfactory application of an appropriate solution (which could be an adaptation of a "packaged" innovation) to the problem initially identified. When the internal group perceives that the problem is solved, satisfaction is high, and problem-coping ability should be enhanced.

The Linkage Model

The Linkage Model is very similar to the Problem-Solving Model in its form and purpose, but is different in the required roles and responsibilities of both internal and external groups.

Assumptions. The most important assumption of this model is that both internal and external groups will work in a collaboration mode;* neither will be the major source of information. In Training for Change Agents (1973, p.23),

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*A cooperative practitioner is an interested and receptive volunteer, whose motivation to cooperate is activated and channeled by the change agent. (Sieber, 1972). A collaborative practitioner is an equal partner with the change agent.

Havelock and Havelock discuss the roles and responsibilities of those working within the Linkage Model:

> The user must be meaningfully related to outside resources . . . must enter into a reciprocal relationship with the resource system . . . Resource persons must simulate . . . the need-reduction cycle of the user . . .Only through an interaction and a feedback from the user can the resource person learn whether or not this model of user-behavior is correct. At the same time, the user should be learning and beginning to simulate resource system processes such as scientific evaluation and product development. The reciprocal and collaborative relationship . . . (and) these overlapping linkages form an extended series which can be described as a "chain of knowledge utilization."

History. Paul (1977) refers to the Linkage Model as being the "most recent and probably most popular change model in education today." He cites Bhola's work in 1965 as being one of the earliest attempts to use linkage, but states that Havelock is "widely viewed as responsible for raising educators' level of awareness about linkage as a process of change."

Stages. As described by Havelock and Havelock (1973), the linkage model follows the same stages as the problem-solving model, moving from a felt need and diagnosis to a problem statement, carrying out search and retrieval in order to find and apply a solution.

Processes. Communication is two way between the change agent and the internal group--focusing on collaboration in all activities, and emphasizing mutual learning. Internal and external resources are tapped, but the change agent is perceived as primarily responsible for identification of appropriate resources.

Influences. Internal and external groups collaborate, simulating each other's roles, and selecting, adapting, or developing an innovation relating

to the identified need. The amount of time taken varies, ranging from two to seven years (Moore et al., 1977).

Effects. Ideally, the problem initially identified should be solved to the satisfaction of both internal and external groups, although internal group satisfaction is usually considered more important. Adaptation may occur, although goal congruency should remain high.

The Organizational Development Model (OD)

Schmuck, Runkel, Arends & Arends (1977, p.3) state that "OD is at once a conceptual framework and a strategy." "There is a good deal of disagreement as to what OD, as it now exists, actually involves, and what it can do in education" (Hayman, Note 3). However, many writers in the field agree that OD borrows from a number of disciplines, including economics, general systems theory, anthropology, sociology, and psychology (Alderfer & Brown, 1975; Margulies & Raia, 1972; Schmuck & Miles, 1971; Hayman, Note 3).

Assumptions. A synthesis of the literature results in the following summarizing statement: Relying heavily on concepts of applied behavioral science, OD practitioners in the role of consultant/human relations experts, involve members of an organization in self-assessment and adaptive behavioral change using interventions designed to improve systematically individual and organizational communication and achievement through planned and sustained effort.

According to Schmuck et al. (1977, p.9) the ultimate goal of OD is "organizational adaptability by which we mean planned and constructive

adaptation of change." Margulies and Raia (1972, p. 5) offer clarification, stating:

> OD is aimed at developing new organizational learning and new ways of coping and dealing with problems . . . (with a) focus on improving the ways in which the technical, administrative, and personal-cultural systems interact with each other, as well as the way in which the organization relates to the external environment.

Hayman (Note 3) points out that OD is not an "easily applied method which can be handled by amateurs." It is apparent from the literature that a change agent is always involved in OD. The change agent may be internal or external to the organization, but is almost always an external consultant.

History. Organizational Development evolved from time and motion studies conducted in industrial settings. Kurt Lewin and the work by the National Training Laboratories in T-group training in 1947 helped to shift the emphasis in OD toward affective rather than intellective methods. T-groups were first used in OD with school district personnel in Seattle in the early 1950s. In the early 1960s, OD was influenced by two concepts: McGregor's Theory Y (1961), and the problem-solving approach proposed by Lippit, Watson, and Westley (1958). The former--Theory Y--pictures the individual as inherently curious and trustworthy, and capable of growth and initiative within an organization, a concept perceived as highly innovative by those in industry and commerce participating in OD activities at that time. The latter--the problem-solving approach (see The Problem-Solving Model, p. 20)--was perceived as a useful set of strategies. The first systematic testing of OD in schools was begun by Miles in 1963. Most recent

OD activities include T-group sessions, are influenced by McGregor's Theory Y, and incorporate problem-solving strategies (Schmuck & Miles, 1971, ch.1).

Stages. Alderfer and Brown (1975) describe four phases: (1) entry and contract setting, (2) data collection and diagnosis, (3) taking action, and (4) evaluation. In the literature, emphasis is placed less on stages and more on three aspects of strategy. "OD is . . . a set of personal values, a set of change technologies, and a set of change processes" (Friedlander & Brown, 1974).

Processes. The change agent conducts small-group sessions related to self-analytic diagnosis of internal members. Inter- and intra-group communication, much of which is affective rather than intellective, is emphasized in order to increase openness and to diagnose the needs of the organization. Action interventions, usually designed by the change agent, may include change in socio-technical systems, job design and enlargement, and job enrichment (Friedlander & Brown, 1974). Resources, such as knowledge, methodology, and diagnostic measures, are provided by the change agent. The innovation is the process itself, influenced by the values inherent in the assumptions presented above, and it is designed to result in organizational changes to improve communication and productivity. The amount of time varies according to the contract and may be as little as one year or as much as four years (Schmuck et al., 1977, p.35). Within that time period group communication sessions are conducted, some of which last for as long as ten hours (Alderfer & Brown, 1975).

Influences. The external change agent, in the role of consultant or human relations expert, applies methods emerging from the behavioral sciences (Margulies & Raia, 1972), such as the techniques used by Carl Rogers and others in group encounter sessions. Internal group members are expected to be cooperative and adaptive. Internal and external individuals and groups work to overcome the problems diagnosed, bringing about changes in patterns of behavior and mode of operation.

Effects. Ideally, the effects of OD include the ability to cope with change, problem-solving capability, and adaptive improvements in communication and technology. User satisfaction should be high. However, outcomes may vary according to the specific needs or goals of the internal organization.

The Local Process of Change Model (LPC)

This model, evolved during the Rand study of Federal Programs Supporting Educational Change, is first mentioned in Volume 1 (Berman & McLaughlin, 1974), and is described more fully in Volume 7 (Berman et al., 1977, p.18). Initially, the model was used as a framework into which federally sponsored programs' loosely fitted.

Assumptions. The model assumes that mutual adaptation will occur, that is, the innovation and the internal organization will change. It is recognized that a variety of interactive factors--such as incentives and constraints, opportunities and conflicts--influence the process of change, and that political considerations are strongly influential.

> The model assumes that the course of a local innovation--including its continuation--results from the interplay between a constantly evolving project and an institutional setting itself subject to change prompted by the innovation or by a variety of internal and external factors . . . Some activities and decisions associated with each phase flow chronologically . . . In addition to this linear sequence, the phases are interconnected by complex and not well understood feedback relationships (Berman et al., 1977, Vol. 7, p.17).

History. In Volume 1 (1974, p. 16) of the Rand study, Berman and McLaughlin proposed a "three-stage process of innovation: support, implementation, and incorporation," as an alternative to "the usual five-stage model of planned change" (The Social Interaction Model). They argued that the traditional concepts of rational practitioner behavior, invariant transfer of innovations, and internal desire for change were unrealistic. As the Rand study progressed, the model evolved: in Volume 4(1975) the stages are called initiation, implementation, and incorporation; in Volume 7 (1977) the phases are called mobilization, implementation, and institutionalization. During the process of evolution some concepts mutated, but implementation remained dominant. The model guided Rand's data collection and analysis, and was influenced by the nature and findings of the study.

Stages. The stages of mobilization, implementation, and institutionalization as presented in Volume 7 of the Rand study are described here.

The mobilization phase begins with a stimulus to change and results in an adopted project and institutional attitudes toward it. Tasks in this phase include problem definition, solution-seeking and selection, and generation of local support. Decisions are made relating to "educational method of treatment," the "scope and complexity" of behaviors to be required

of staff, and the nature and scope of "implementation strategies." During the period of mobilization, individuals--from the central office staff to the classroom teachers--develop attitudes toward the project which are crucial to its success or failure.

Implementation involves the mutual adaptation of the innovation and the organizational setting. Those involved in the Rand study argue that the nature of the adaptations influences subsequent decisions and actions, and that, therefore, data collection is important during the implementation phase.

Institutionalization is a combination of assimilation by individual teachers and incorporation of the innovation by the school system. When the teacher "institutionalizes some personal adaptation of the project's methods or materials" the term "assimilation" is used. When the school system "routinely provides for the project's maintenance" the term "incorporation" is used. Institutionalization may begin during the implementation phase and is dependent upon a variety of factors.

Processes. Activities are integrated across all three stages and are particularly important during mobilization and implementation. Attention is paid to planning, support, and training activities and to strategies of implementation such as the use of feedback and scheduling of meetings for teachers. Communication occurs among all levels or units of adoption and may include external agents.

Influences. The internal organization and its members are far greater influences than the external group. The internal group is perceived as cooperative, adaptive, and influential. If an external group is involved,

for instance as the source of innovation, or as a consultant, the role is usually that of an expert linker or field agent. The innovation may be one of two kinds: it may be one from an external source that becomes adapted and influences changes in the internal system during the process of change, or it may be one which is generated by the internal group with the help of an external group.

Effects. The ideal outcome is the institutionalization of an innovation which, although adapted, retains its initial integrity, and satisfies the needs of the users.

Comparison of the Six Models of Change

Table 1 summarizes the stages and identifies the developers or proponents of each of the six models of change. It is apparent that evolution and mutation of several concepts have occurred. Although it may be of interest to explore in detail the reasons for and the specific nature of this process of evolution, for the purposes of this paper it is more relevant to examine the differences among models in an attempt to determine relative advantages and disadvantages.

It should be understood that each model was developed for a different purpose in response to varying needs. Sieber (1972) argues that each model of educational change is "rooted in a particular image of the practitioner," and is distinct from other models in its "locus of change, the channel of influence that it utilized, and the type of change agent that is involved." Morrish (1976, p.109) agrees with Sieber and points out that each model "views the change process differently" and implies a different strategy

Table 1

Stages in Six Models of Educational Change

Model	RDDA	Social Interaction	Problem Solving	Linkage	OD	Local process of change
Developers and/or proponents	Brickell, 1961: Clark & Guba, 1967	Rogers, 1962; Rogers & Shoemaker, 1971	Lewin & NTL, 1947; Lippit, Watson, & Westley, 1958	Bhola, 1965; Havelock, 1969	Lewin & NTL, 1947; McGregor, 1961; Lippit, Watson, & Westley, 1958	Berman, et al., 1975, 1977
Stages	1. Research	1. Awareness	1. Translation: need→problem	1. Identification (of need)	1. Entry & Contract Setting	1. Mobilization a. Problem definition b. Solution seeking c. Solution selection d. Generation of support e. Decision-making (re: strategies)
	2. Development a. Invention b. Design	2. Interest	2. Diagnosis (of problem)	2. Diagnosis (of problem)	2. Data collection	2. Implementation: Mutual adaptation of project and organization
	3. Diffusion a. Dissemination b. Demonstration	3. Evaluation	3. Search & Retrieval	3. Problem Statement	3. Diagnosis (of organization)	3. Institutionalization: Assimilation by teachers and Incorporation by school system
	4. Adoption a. Trial b. Installation c. Institutionalization	4. Trial	4. Adaptation (of innovation)	4. Search & Retrieval	4. Action interventions	
		5. Adoption	5. Trial	5. Selection (of Innovation)		
			6. Evaluation	5. Implementation		

and a different series of techniques. Maguire (1970, p.4) emphasizes the differences among models, pointing to the varying degrees of abstractness and completeness, and differences of perspectives and variables covered, and recommending that anyone faced with the task of selecting a model appropriate to a given situation should first recognize "that existing models do not all speak to the exact same issue."

The literature presents several analytical comparisons, using a variety of perspectives, dimensions, and criteria, and examining some of the six models discussed here as well as others. However, no two writers use the same dimensions, and no single writer compares all six models under consideration here. In order to standardize available information, the comparisons presented in Tables 2 and 3 are synthesized from a variety of sources. Tables 2 and 3 should be interpreted with a certain degree of caution, since the statements presented are general and do not allow for variations. Also, it should be understood that many factors can prove influential, positively or negatively, within any given dimension. However, even at a general and somewhat simplistic level, the tabulated comparisons may serve to clarify each of the models and the differences and similarities among them.

The broad dimensions of processes, influences, and effects are drawn from Paul (1977), who analyzed over 100 recent empirical studies. Others who influenced the following discussion include: Berman et al., 1977; Havelock and Havelock, 1973; Morrish, 1976; Sieber, 1972; and Miles, Note 5.

Processes. Table 2 presents two components of process: activity and communication. Both are described in very general terms, focusing on the dominant individual or group and commonly prominant activities and modes of communication of a given model.

In all six models R&D resources and/or knowledge are used to some extent. However, the degree of emphasis on R&D utilization varies among the models. In the RDDA and Social Interaction models, the innovation is based on R&D and is provided by an external group, such as an R&D agency. This may also be the case in the Local Process of Change (LPC) model, but the R&D impact is modified by the influences brought to bear. In the models of Problem-Solving, Linkage, and Organizational Development (OD), R&D may provide a knowledge base for change agents and/or practitioners. R&D resources and methods are usually chosen by the change agent to meet practitioner needs.

Technical assistance or training is included in every model, and is most prominent in the models of Problem-Solving, Linkage, and OD. In the Problem-Solving and Linkage models, technical assistance is aimed at building practitioner capability in problem-solving techniques and in the use of skills and knowledge relevant to the practitioner's needs. In OD, technical assistance activities are more affective, focusing on communication skills, self-analytic diagnosis by practitioners, and sometimes the use of problem- solving techniques. In all three of these models, technical assistance is usually provided by an external change agent. In the RDDA and Social Interaction models an external change

Table 2

Models of Change in Terms of the Dimension of Process

Models	Processes	
	Activities	Communication
RDDA	R&D provides innovation and related technical assistance	One way: from R&D to practitioner; intellective
Social Interaction	R&D provides innovation and related technical assistance	One way: from those who know to potential users; intellective socially interactive
Problem Solving	CA provides resources, training/assistance to build practitioner capability	Two way: CA/practitioners--each providing information; primarily intellective
Linkage	CA provides resources, training/assistance to build practitioner capability	Two way: CA/practitioners--building chain of knowledge; primarily intellective
Organizational Development	CA conducts group communication sessions related to self-analytic diagnosis of practitioners	Multi-directional: CA/inter- and intra-group communication, primarily affective
Local Process of Change	CA and/or practitioner use of resources/assistance; integrated at all stages by all practitioner levels	Two way: CA/practitioners and/or multi-directional, inter-group

Key: R&D=Research & Development CA=Change Agent

agent also provides technical assistance when it is required by the nature of the innovation. In these two models, assistance is primarily intellective and designed to inform practitioners about the innovation. In the LPC model, an external change agent may provide technical assistance, or internal group members may determine, design, and deliver technical assistance to each other; activities are integrated, involve all practitioner levels, and are strongly influenced by the nature of the innovation.

In the RDDA and Social Interaction models, communication is one-way--from those who know about the innovation (e.g., an R&D agency) to practitioners. In the LPC model, the same pattern of communication occurs if the innovation has been generated elsewhere. However, two-way external-internal communication, and cross-group internal communication is also likely to occur in the LPC model. These same multi-directional communication patterns also occur in the other three models, with intellective two-way communication dominating in the models of Problem-Solving and Linkage, and affective inter- and intra-group communication dominating in OD. There is a major difference between the Problem-Solving and Linkage models in the nature and use of information. In the Problem-Solving model, information is traded and validated to and fro between the internal and external groups. In the Linkage model a similar process occurs, but each group is expected to internalize the other's knowledge, building a double-linked chain of knowledge and skills.

Influences. There are three components to the dimension of influence in the process of change: internal (practitioner) roles and responsibilities, external (change agent) roles and responsibilities, and the nature of the innovation. Table 3 illustrates the similarities and differences among models across these three components.

In general terms, the order in which the models are presented in Table 3 indicates a rank order of the degree of influence exerted by practitioners, ranging from very little power in the RDDA model to comparatively greater power in the LPC model. Although practitioners are expected to be rational in the models of RDDA, Social Interaction, and LPC, in the first instance practitioners are relatively powerless, in the second they can influence others to adopt an innovation but can exert little influence on the innovation, and in the third instance (LPC) they can adapt the innovation and may also adapt their own practices. In the other three models, practitioners play a cooperative role. This ranges from the application of learned knowledge and skills in the Problem-Solving model to reciprocal and collaborative application of knowledge and skills in the Linkage model. In the OD model, practitioners cooperate with each other and with the change agent on two levels: (1) directed toward changes in patterns of behavior among internal groups, and (2) directed toward changes in mode of operation within the internal agency.

External influence is held by an agency or its representative--generally referred to as a change agent--who may play a variety of

Table 3

Models of Change in Terms of the Dimension of Influences

Models	Influences		
	Internal Role	External Role	Innovation
RDDA	Rational, passive	Expert	Prespecified "package"
Social Interaction	Rational	Expert/field agent	Prespecified "package"
Problem Solving	Cooperative	Consultant/expert	Solution to internal problem
Linkage	Collaborative	Linker	Solution to internal problem
OD	Cooperative	Consultant/human relations expert	Changes in patterns of behavior and mode of operation
LPC	Rational/Adaptive/ Cooperative	Expert/consultant	Modified version of prespecified "package," and/or solution to internal problem

roles. When the innovation is prespecified, for instance in the models of RDDA, Social Interaction, and sometimes in LPC, the change agent is an expert on that innovation and may provide appropriate training or technical assistance to practitioners. In the Social Interaction model the change agent also enlists the interest and support of practitioners in a communication network, attempting to achieve widespread adoption of the innovation. In the OD and Problem-Solving models the change agent is a consultant, using human relations/behavioral science expertise in the former case, and, in the latter case, using expertise relating to a variety of areas, such as evaluation, needs assessment, resource utilization, and program improvement. In the Linkage model the change agent is a linker, linking human and material resources to meet practitioner needs.

The nature and source of the innovation influences the process of change. In the RDDA and Social Interaction models, the innovation is prespecified and often consists of a complete program package designed to be used without adaptation by practitioners. A prespecified innovation may also be used in the LPC model, but, because of the perspective of mutual adaptation essential to this model, the innovation will probably be adapted. In the models of Problem-Solving and Linkage, the innovation is one designed to satisfy the needs of the internal organization. Thus, it is possible that a prespecified innovation is adopted as is, or with some modifications, or the innovation may be generated by the internal group with external assistance. In general, the innovation in

OD consists of patterns of behavior and mode of operation designed to facilitate communication between internal groups and to increase productivity. The exact nature of the changes is dependent upon the results of the self-diagnosis of practitioners.

Effects. This dimension may be examined from several perspectives, such as student achievement, stake-holder satisfaction, goal congruence, and the level of use of the innovation. Although there are attempts in the literature to generalize about effects for each of the models, the results are somewhat vague. Without examining the specific perspectives, it appears that internal satisfaction is likely to be higher when the internal role is cooperative or collaborative rather than passive or powerless, and that when practitioners perceive an innovation as a useful solution to their own problems they are likely to make efforts to implement it effectively.

Generalizations and Propositions

Paul's analysis of empirical data provided the basis for a series of generalizations about implementation. Classifying the generalizations under the dimensions of processes, influences, and effects, Paul rates each statement on a four-point scale ranging from "firm" to "speculative." "If the generalization...is strongly supported by a number of studies, then it may be considered firm" (Paul, 1977). Those generalizations rated as "firm" are summarized here:

- Change agents must be perceived as legitimate and must overcome resistance in order to improve awareness of innovations.

- Teachers tend to rely on and work best with fellow teachers in collaboration for change.
- Participation in decision-making by those affected by a change program is beneficial.
- The relative advantage, compatability, and complexity of an innovation influences its implementation.

Havelock and Havelock (1973, p.38) report the conclusions of change experts who participated in a conference at the University of Michigan. Four models were discussed and ranked. In order of preference the models are: (1) Linkage--25 participants place this model first; (2) Problem-Solving--19 participants placed this model second (8 had assigned it first place); (3) RDDA--17 participants place this model third (3 ranked it higher than third place, and 10 ranked it fourth); (4) Social Interaction--21 participants placed this model fourth (12 gave it third place, and 11 ranked it higher than third).

Havelock and Havelock report that propositions relating to each of the four models were discussed by conferees, who were asked to determine the relative importance and validity of each proposition. Havelock and Havelock present a detailed explanation and argument for each proposition. Those perceived as "essential" or "very important" to success by 75 percent or more of the change experts are summarized here.

Important propositions relating to RDDA (Havelock & Havelock, 1973, p.14) include:

- Successful innovation usually requires formal planning, short-term and long-term;

- Innovation is more effective when formal evaluation is conducted at each step of development, diffusion, and installation.

Important propositions relating to Problem-Solving (Havelock & Havelock, 1973, p.9) include:

- The user's need is the paramount consideration in any planned change activity;
- User's needs must be translated, defined, diagnosed, and clearly stated in order for the needs to be served effectively;
- User-initiated change is likely to be stronger than externally-initiated change.

Important propositions relating to Social Interaction (Havelock & Havelock, 1973, p.20) include:

- Influential opinion leaders facilitate effective dissemination and utilization;
- Informal person-to-person contact is an important factor in effective dissemination;
- To achieve utilization a "synergy" of combined, sequential, and repeated messages pertaining to the innovation must be directed at the potential user.

Important propositions relating to Linkage (Havelock & Havelock, 1973, p.29) include:

- Resource persons must be able to simulate the user's problem-solving process;
- Effective utilization requires reciprocal feedback;
- Resource systems should develop collaborative relationships with a variety of users and a large diverse group of other resource systems;

- Users should develop reciprocal and collaborative relationships with a variety of resource systems (have a "cosmopolitan" outlook);
- Resource persons and users should have a willingness to listen to new ideas.

Maguire (1970, p.4) points out that practitioners are supposed to select an appropriate change model, suggests that understanding of the models is essential, and argues that the available literature does not appear to be of great value to practitioners attempting this task. Short (1973), writing three years later, supports Maguire's position. In presenting their arguments, both writers address the situation where practitioners are working without external assistance. However, both Maguire and Short continue their discussions by suggesting that external/internal linkage could be useful in alleviating practitioners' difficulties in effectively implementing educational change.

In the last three or four years, several studies and syntheses of findings have been reported which seem to indicate that it is possible for change agents to collaborate with practitioners in effectively using research-based innovations. With a view to exploring this possibility, the next part of this paper reviews some recent studies based upon the six models of change discussed.

Reviews of Seven Studies of Implementation

This part of the paper reviews seven* recent studies of implementation. The selection was guided by three factors: (1) the purpose of the paper, (2) the relationship of models of change to studies, and (3) features of particular interest in available studies.

Since one of the purposes of the paper is to inform and guide those who are unfamiliar with the literature, the studies selected illustrate the kinds of factors considered important in the study of implementation, such as processes, influences, and effects. An attempt was made to find studies related to the six models of change in order to illustrate the application of those models. Finally, some studies were selected because they include a feature of interest such as method of measurement, the nature and use of the innovation, or the kinds of strategies used to facilitate implementation.

The first study, reported by Hall & Loucks (1977), focuses on a method of measurement--Levels of Use (LoU)--used to collect data on the use of individualized instruction in reading and mathematics. The program including this innovation was developed and disseminated following the Research, Development, Diffusion, Adoption model. Findings from the LoU based on traditional comparison of "experimental" and "comparison"

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*Two studies illustrate OD, and one study is reviewed for each of the five other change models.

groups indicate no significant differences in student achievement. However, analysis of users of the innovation, whether or not they are classified as "experimental" or "comparison," indicates that in some cases student achievement is clearly affected by the level of use of the innovation.

The second study, conducted by the Bureau of Applied Social Research at Columbia University, focuses on the activities of field agents operating within the concepts of the Social Interaction model to encourage practitioner use of information resources.

The third study, conducted by the Stanford Research Institute, describes the implementation of six Project Information Packages (PIPs) initially developed in local school settings. The assumptions of the project imply the orientation of the Problem-Solving model. However, there was no personal change agent; the packages were intended to fulfill that role. Therefore, this study is considered to be an example of a modification of the Problem-Solving model.

The fourth study, conducted by the Center for New Schools, is based on six case studies of technical assistance groups (TAGs) working at the school/community level. The behaviors of field agents (TAG facilitators) reflect the linker behaviors advocated by Havelock and Havelock (1973), although the sequence or pattern of activities deviate in some instances from the Linkage model. In spite of these deviations, the TAG study is included as the closest illustration of the Linkage model available at present.

Two studies are included to illustrate Organizational Development (OD). The first, reported by Alderfer and Brown (1975), is a case study of activities within one school, and relates primarily to interpersonal communication behaviors of students and faculty. The second, described by Schmuck and Miles (1971), focuses on teacher application of OD techniques designed to improve student group processes and interpersonal communication skills. Two studies are included since no single study using OD values, processes, and techniques may be considered "typical," but two different studies may illustrate common alternative approaches.

The last study, conducted by the Rand Corporation, stimulated the development of the Local Process of Change model, and describes the implementation and extent of continuation of four federally funded programs.

A Study of Levels of Use of an Innovation

Recent research undertaken at the Research and Development Center for Teacher Education at the University of Texas at Austin focuses on the study of implementation of innovations in schools and colleges. One outcome of this research is a measure called Levels of Use (LoU), which includes eight levels identified through clinical experience and subsequently verified through application (Hall & Loucks, 1977). The complete measure consists of eight levels, each separated by a decision point indicating a definite action, and each operationally defined under seven categories of knowledge and behavior. The content is designed to measure

the behaviors of users and nonusers of an innovation. Table 4 summarizes the levels, decision points and definitions.

Hall and Loucks (1977) report several studies in which the LoU was used. Using a focused interview with the specific innovation as a frame of reference, the interviewer conducts what "appears to be a casual conversation about what the interviewee is doing in relation to the innovation," taking about 20 minutes for each teacher. The taped interview is rated independently by two or more trained raters to determine the level of use. When raters disagree, the contents of the interview are analyzed and rated by a committee. In one study, ethnographic observation was used in addition to the interviews for purposes of comparison and validation.

One of the several studies reported by Hall and Loucks provides an example of their work. In collaboration with the Austin Independent School District, center staff conducted an evaluation study of the individualized instruction in second and fourth grade reading and mathematics components of the Individually Guided Education (IGE) program. The LoU was used by interviewing 134 teachers from 22 schools, 11 of which had been implementing IGE for two or three years, and 11 of which were non-IGE schools.

Findings. Comparisons were made of student achievement in IGE and non-IGE schools. "A sizable number of IGE school teachers were not in fact individualizing, and many of the teachers in the non-IGE schools were individualizing their instruction" (Hall & Loucks, 1977).

Table 4

Levels of Use: A Summary of a Measure of Implementation

Levels	Definition
0 Nonuse	User has no knowledge of or involvement with the innovation
Decision A	Takes action to learn about innovation
I Orientation	Is acquiring information; exploring value orientation and demands of innovation
Decision B	Decides to use the innovation; establishes time to begin
II Preparation	Is preparing for first use of innovation
Decision C	Determines use and changes, if any, according to user needs.
III Mechanical	Focuses on short-term day-to-day use, attempting to master tasks required by innovation
Decision D-1	Establishes a routine pattern of use
IVA Routine	Stabilizes use
Decision D-2	Changes use based on evaluation to increase client outcomes
IVB Refinement	Varies use to increase client outcomes, knowing short-term and long-term consequences for clients
Decision E	Initiates changes in coordination with colleagues
V Integration	Combines efforts and activities of self and colleagues to achieve collective impact on clients
Decision F	Explores alternatives to or modifications of innovation
VI Renewal	Reevaluates quality of use of innovation, explores modifications, alternatives, new developments and goals to increase client outcomes

The authors report that when all the users (regardless of whether they were IGE or non-IGE) of individualized instruction were grouped together by grade level, and student achievement was compared with nonusers, "a different picture resulted." In reading, second grade achievement was greater for users than nonusers, but fourth grade achievement was greater for nonusers. In mathematics, there was no significant difference between users and nonusers at the second-grade level, but at the fourth-grade level users showed greater achievement than nonusers.

Hall and Loucks then examined the relationship between student achievement and the Level of Use. Analysis of the second grade sample indicated that student achievement in reading increased slowly, "peaking at LoU III and IVA and decreasing for higher levels." Achievement in mathematics increased steadily from LoU I to LoU V. (None of the teachers in either subject reached LoU VI.)

The authors do not attempt to generalize from these findings and do not discuss the implications. However, the methods of analysis and the results reported indicate the importance of determining use and non-use of an innovation in sites supposed to be using the innovation and in sites supposedly not using the innovation, if program effectiveness is to be assessed in terms of student achievement.

The Pilot State Dissemination Project

Initiated in 1970 by the U.S. Office of Education, this program provided federal support to three state education agencies for a two-year

period "to develop and test strategies for bridging the acknowledged gap between the research and practice sectors of the educational community" (Emrick & Peterson, 1978, p. 5). Evaluation was conducted by Columbia University's Bureau of Applied Social Research and reported by Sieber et al. in 1972.

Each of seven field agents was assigned a specific territory, ranging in size from a school to a county or region. Field agents were to interest practitioners in using information resources and to help in defining needs, interpreting information, and using information to improve local programs and practices. Field agents were backed by information retrieval personnel and consultants or specialists. In each of the three states a project director assumed overall leadership and management.

Data were collected by observation resulting in a series of case studies, and through structured instruments such as a goal checklist, self-report questionnaires, and information retrieval forms.

Findings. Emrick and Peterson summarize the key findings of the study, stating that field agents were successful in reaching client groups "traditionally unlikely to seek information and assistance from outside sources," and were particularly successful in stimulating requests from elementary school teachers.

Features of the field agent role that appeared to influence success included:

- As generalists they could respond to a wide range of interests;

- As state employees, and therefore outsiders, they could be objective;
- As previous teachers or administrators in the region they were familiar with norms and customs which probably added to their credibility;
- Their lack of power to mandate change minimized friction between themselves and local practitioners.

Problematic issues encountered by field agents included:

- Difficulty in gaining access to potential clients;
- Lack of engagement in needs assessment and diagnosis;
- Insufficient follow-up activities to sustain client effort;
- Poor communication between project staff, leading to insufficient guidance for field agents, leading to individual definition and interpretation of goals and roles.

This study is of interest to change agents since the findings specify facilitators and barriers to change efforts in which external agents are involved. It is also of interest to those engaged in encouraging practitioner use of information.

Evaluation of the Field Test of Project Information Packages

This study, reported by Stearns and Norwood of the Stanford Research Institute (SRI) in 1977, is summarized by Emrick and Peterson (1978). Under contract to the U.S. Office of Education, SRI undertook a two-year study of the implementation and outcomes of six Project Information Packages (PIPs). The packages were designed to provide district staff with information needed to install and operate effective approaches to compensatory education in reading and mathematics.

not prescribe specific curricula and therefore instructional programs varied considerably. The packages emphasized management, being designed to facilitate duplication of conditions for effective instruction, such as pupil/teacher ratios, time for intensive instruction in basic skills, and availability of extensive resources. "The evaluators concluded that it was probably not reasonable to expect management considerations to exert a strong and direct influence on student achievement" (Emrick & Peterson, 1978, p. 20).

Although the PIPs were found to be useful for programs requiring specified resources and easily understood procedures, they were less effective when programs required significant organizational or behavioral change on the part of the users. The evaluators concluded that an "intermediary is needed to publicize (PIPs) to LEAs...to generate interest...and to provide moral support and encouragement" (Emrick & Peterson, 1978, p. 21).

The implications of this study indicate that the initial assumptions were not entirely valid, mainly because of the nature of the PIPs (e.g., lack of assistance), and partly because of the nature of the educational organizations (e.g., lack of effective behavioral change). Of interest to researchers is the conclusion reached by the program evaluators that classroom management cannot be expected to influence student achievement strongly. This conclusion would probably be challenged by those who consider that management and instruction are interrelated and are both strongly influential (e.g., Fullan & Pomfret, 1977; Heathers, 1972; Schmuck & Miles, 1971).

Assistance Strategies of Six Groups that Facilitate Educational Change at the School/Community Level

This study, conducted and reported by the Center for New Schools (Moore, et al., 1977), describes the activities and results of six separate technical assistance groups (TAGs), which provided face-to-face help to practitioners, parents, and/or students involved in local change efforts. The six TAGs as described in the report summary (Moore et al., 1977) were:

1. AFRAM Associates (AFRAM). A Harlem-based group that has provided assistance to parents at eight Follow-Through Program sites, in four states and Washington, D.C. AFRAM attempts to help parents become full partners in their children's education in terms of decision-making and day-to-day involvement in schools.

2. Center for New Schools (CNS). A group that has attempted a variety of assistance strategies for changing urban schools, with an emphasis on using qualitative research studies of successful change efforts as a source of information for assistance.

3. Creative Teaching Workshop/Experiential Systems, Inc. (CTW). An advisory group working with teachers and principals in several New York public schools with a focus on using concepts and techniques of direct experiential learning with both children and adults.

4. Institute for the Development of Educational Activities, Inc.(/I/D/E/A/). A group of educators who have developed Individually Guided Education (IGE). IGE is an approach to individualizing student learning programs that entails a changed approach to planning and carrying out instruction, on-going staff development, and social reorganization of the teaching staff. Having developed the change strategy and related materials, /I/D/E/A/ staff have trained staff from Intermediate Agencies such as state departments of education to provide on-going assistance for carrying out the IGE program in over 1200 schools.

5. Rural Education Program (REP). A group developing a strategy for assisting rural schools and communities to carry out a systematic problem-solving process to deal with priority local school problems. REP is currently field-testing their approach through training and supporting local facilitators working in two rural school districts and is developing training and support mechanisms within state and intermediate education agencies to assist the change process at the local level.

6. United Bronx Parents (UBP). A group of parent activists in the South Bronx section of New York City who assist local parent groups in the area to increase their influence in local schools through training, acting as advocates for individual students, and community organizing. (p.3)

Each of the six TAGs carried out change efforts consistent with the following seven principles: (1) the school community is a social system, some aspects of which are altered in the process of educational change; (2) schools are loosely-coupled organizations, a fact which makes change difficult; (3) incentives for change are weak since schools have multiple unclear goals and no established methodology for reaching those goals; (4) the school system has an interdependent relationship with other social systems, some of which, e.g., parents, should be involved in change efforts; (5) face-to-face communication and assistance facilitate implementation of innovations; (6) the process of implementation is vital, given the fact that those adopting the innovation are rarely involved in carrying it out; and (7) characteristics of successful adoption and implementation include local development or modification of innovations, support, and on-going training and assistance.

The study focused on:

> the internal functioning of the individual TAGs...the process by which the individual TAGs provide assistance... techniques and circumstances that lead to greater or lesser effectiveness in particular circumstances...comparison of similarities and differences between the TAGs in the areas of study focus. (Moore et al., 1977, pp. 7-8)

Data collection included informal interviewing and participant observation, and resulted in a series of case studies and comparative analysis of the six TAGs.

Findings. The Center for New Schools report summarizes the key similarities of the TAGs. These similarities are further summarized here.

1. The founding of the TAG is critical and includes drawing on a local tradition of change to generate a strategy of diagnosis and prescription and to identify the roles and responsibilities of those involved.

2. Four interdependent areas of activity--maintaining effective TAG internal management, obtaining and maintaining funds, developing assistance strategies, and carrying out assistance efforts--are the focus of effective TAGs.

3. The TAG leader must be strong, willing to project a clear direction and set clear limits, and able to act in the best interests of the TAG goals.

4. TAG staff need to be able to adjust to complex managerial problems, cope with evolving tasks and pressures, and work together interdependently.

5. Effective TAGs accept the perspective of mutual adaptation but make adjustments gradually "after careful analysis of experience."

6. By careful selection, and socialization through planned activities and feedback, TAG staff are drawn into a team effort.

7. Effective TAGs develop mechanisms for their own members to participate in decision-making.

8. In effective TAGs, fund-raising is approached as a necessary on-going task. However, since a complete TAG effort takes from five to seven years, and since it is difficult to obtain funding for such a sustained period, TAGs are often forced to move on to new activities before the first is completed.

9. Optimal staff size for a TAG is seven. Expansion to include 15-20 staff--triggered by an effort in a different geographical area, or by funding for a new project--results in management and communication problems.

10. Effective TAGs move continually toward coherent action-oriented strategies of assistance through on-going involvement with schools following a regular cycle of analysis and assistance.

11. Effective TAGs are proficient at mapping the social systems they are trying to change, using sophisticated analysis and prediction of interacting roles and actions.

12. In addition to face-to-face assistance, effective TAGs develop and use a variety of quality materials.

13. Whether a TAG is external or becomes an integrated part of the internal system is immaterial as long as TAGs successfully adapt to the strengths and weaknesses of their position.

14. Effective TAG strategies include focused and coordinated efforts, teaming of TAG facilitators, regular supervision, and involvement of all TAG members in analysis of assistance efforts.

15. TAG facilitators (field agents) accept the TAG philosophy and strategies and have personal characteristics, training, and experience that build their credibility in schools and prepare them for their role tasks.

16. Following careful mapping of a potential change site, effective TAGs accomplish three tasks during the entry process: (1) establishment of TAG credibility with school system, (2) development of mutual obligations and limits, and (3) realistic assessment of whether or not TAG capabilities match the needs and characteristics of the school system.

17. Effective assistance results from a combination of four techniques:

> "(1) structured experiences (e.g., workshops), (2) over-the-shoulder assistance (e.g., advice as part of a parent strategy session), (3) modeling (e.g., working directly with a student in using a new reading technique), (4) provision of materials (e.g., giving teachers interested in improving staff meetings a booklet on group process)." (Moore et al., 1977, p. 20)

18. TAGs must adapt to local conditions, constraints, and crises.

19. Effective TAGs discourage dependency, minimizing situations in which the TAG does things for the school system, and designing activities that entail constant transfer of skills and knowledge to school personnel.

20. TAGs make efforts to promote long-term incorporation of the changes initiated. Persistence of changes is associated with: (1) accurate mapping of social systems, which leads to assimilation of the innovation by a critical mass of teachers and parents, and the active support of the school principal, (2) a focus on central social processes and structures; (3) efforts to develop commitment to the innovation by administrators, and to develop a permanent network of local facilitators; (4) transfer of TAG skills to school systems; and (5) attempts to develop internalization of positive attitudes among practitioners.

21. Effective TAGs engage in certain critical activities which fall into five areas: (1) formation, (2) management, (3) funding, (4) strategy development, and (5) assistance. A total of 103 critical activities are identified.

This study provides a wealth of detail, and presents summarized findings consistent with the findings of other recent major studies. However, the summarized findings should be viewed with caution, partly because they are so generalized, and partly because the six cases differ radically in their goals, philosophy, organizational structures, and operational methods.

A Case Study of Organizational Development in a School

Alderfer and Brown, in Learning from Changing (1975) report a case analysis of a boarding school that engaged in a "four year research and consultation relationship with the authors as external researcher-consultants" (p. 26). Two major objectives were specified by the school principal:

> (1) help in managing the present tensions internal to the school, and (2) help in planning and implementing changes at the school appropriate to innovative education in the seventies (p. 32)

Following an invitation from school faculty to the Department of Administrative Science at Yale in the spring of 1969, the authors, with five graduate students and another faculty member from Yale, conducted a two-day workshop with students and faculty in small groups at the school. Later that year a contract was agreed upon specifying roles, responsibilities, and activities. From September 1969 to June 1973 data were collected through observations, questionnaires and interviews; diagnosis and feedback meetings were held; recommendations were made; and regular and frequent consultation occurred between the change agent and the school principal.

Throughout the study, the authors made "extensive use of group methods to achieve entry, continuity, and evaluation of (the) work" (p. 51). Group meetings are described as "sensitivity sessions" (p. 37), "laboratory workshops" (p. 39) and "T-group meetings" (p. 39).

These group meetings were the major activities during the first year, and were designed to improve communication, climate, and relationships among participants, and to facilitate individual self-awareness. Later, consultations between the change agent and school principal became the major activities.

Findings. Approximately half-way through the project a faculty assessment committee was formed to determine whether or not the project should continue, and to conduct evaluation of the project separately from the consultants. This was in response to negative feelings expressed by some faculty members. The decision made by the committee indicated that it "did not end its deliberations with wild enthusiasm for the project, but they (the members) were willing to let the work continue." This reluctant acceptance and the mixture of reactions of participants pervade the study and discussion of results. "The outcomes reported may be less significant than the processes used to reach them" (p. 198). Results, agreed to by both the faculty assessment committee and the consultants, are presented in general terms:

- Harrassment of younger students by older students decreased.
- Student satisfaction with school increased.
- Prefects (i.e., senior student monitors) showed less partiality and reported violators of school rules less frequently.
- The level of sarcasm used by students declined.

The authors discuss alternative explanations (i.e., factors other than the project interventions) for these results, but conclude that

"constructive behavior changes occurred in the school between 1969 and 1971, and that these changes could be tied in direct ways to planned interventions."

A Study of the Use of OD to Improve Classroom Group Processes

Chapter 2 of OD in Schools (Schmuck & Miles, 1971) describes a study involving 50 classroom teachers, conducted in the 1965-1966 school year, and designed to improve classroom group processes. Twenty teachers in Group A participated in seven core training activities attending daily six-hour sessions for four weeks during the summer of 1965, followed by feedback discussions, and bi-monthly sessions from September through December. Twenty teachers in Group B participated in five training activities (all except activities numbered one and six below), attending weekly seminars and individual conferences. Ten teachers in Group C received no training. The training activities were:

1. Sensitivity training and related human relations laboratory experiences.
2. Didactic discussion on basic research about classroom group processes.
3. Problem-solving techniques for improving group processes.
4. Analyses of diagnostic data from the teachers' own classrooms.
5. Discussions about useful classroom practices developed by other teachers.
6. Role-play tryouts of new classroom practices.
7. Follow-up discussions during the school year.

Data were collected from self-report questionnaires, teachers' diaries, and observations scheduled three or four times for each teacher during the year.

Findings. Results were determined at the end of the 1965-1966 school year. They are summarized here:

- In Group A, teachers and students made more positive changes than those in Group B, and both Groups A and B were more improved than Group C.
- Group A teachers were more cohesive as a group; they communicated and socialized more.
- Group A produced more elaborate plans of action and attempted more practices for improving group processes.
- Group A placed emphasis on the goal to increase openness in classroom communication, using such strategies as role-playing and the use of suggestion boxes to increase and facilitate discussion.
- In seven Group A classrooms, student governments were formed and functioned successfully throughout most of the year.

Both this study, and the study conducted by Alderfer and Brown are of interest for two reasons. First, in both cases, the authors were the source of innovation and intervention, the external change agents, the evaluators, and the reporters. This multiplicity of roles is common among OD practitioners. Secondly, in both cases, the innovation relates almost entirely to interpersonal communication; again, a common feature in OD. Although some researchers (e.g., Hayman, Note 3) argue that OD has not proved successful in schools, it may also be argued that if the goal is to improve communication OD may be successful.

A Study of Federal Programs Supporting Educational Change

In 1973 the Rand Corporation, under contract to the U.S. Office of Education, began a study of four federally funded programs: ESEA, Title III; ESEA, Title VII; Vocational Education, 1968 Amendments, Part D; and Right to Read. It was assumed that the federal "seed money" would allow Local Education Agencies (LEAs) to install new projects, and that when external funding was withdrawn (e.g., after three years for Title III), the LEAs would discontinue ineffective projects and continue successful ones with local funds (Emrick & Peterson, 1978).

The Rand study, reported by Berman et al., (1974-1977), was conducted in two phases. Phase I examined local projects during their last or next to last year of federal support and focused on initiation and implementation issues. Phase II examined the data of the projects after federal funds had been withdrawn. Data collection included:

> A (personal interview) survey of teachers, principals, and administrators at 293 sites and interview/observation studies of 29 sites drawn from the survey sample. (Emrick & Peterson, 1978, p. 12)

Findings. Phase I research indicated that federal funding stimulated change at the local level on two dimensions of motivation: problem-solving, and opportunism. The problem-solving orientation indicated that LEAs initiated projects perceived as solutions to locally recognized high-priority needs. "Opportunistic" districts defined needs "in response to the guidelines that accompanied the federal dollars"

(Emrick & Peterson, 1978, p. 14). Phase II research indicated that in opportunistic districts, projects had little impact in terms of changed behaviors or practices, and rarely survived when federal funds were withdrawn.

In addition to the motivation of the LEA, three other factors were found to influence processes and outcomes: the nature and scope of the change, the implementation strategy, and the level of institutional support. Emrick and Peterson summarize the findings for each of these factors.

When the nature of the change was designed to influence teacher behavior, teachers responded positively, making extra efforts. If the scope of change was complex or introduced in many classrooms simultaneously, problems of coordination occured.

Implementation strategies--the means by which local project leaders guided and supported users--were a major focus of the study. Emrick & Peterson (1978, p. 15) summarize the strategies characteristic of successfully implemented projects:

- staff training focused on practical aspects of project operations;
- high levels of support activities for participants (e.g., visits to demonstration classrooms; observation of implementation efforts and feedback from project leaders or consultants);
- frequent meetings of project staff;
- staff involvement in decisions affecting project operations;

- inclusion of highly motivated staff who volunteered to participate and, in some cases, were selected by project leaders as "most likely to succeed;"
- targeting of change efforts to elementary schools;
- involvement of a "critical mass" of participants.

Institutional support at both the district and school levels, was a critical factor. Although endorsement was sufficient at the district level, more active support by principals was necessary for success.

Phase II results are reported by Berman et al. (1977, Vol. 7). The authors describe three categories of factors relating to implementation and teacher change: federal input, project characteristics, and institutional setting.

In the category of federal input, the authors state "any change wrought in district practices depended on what the district did with the funds, not on dollar amounts" (Berman et al., 1977, Vol. 7, p. ix).

Three factors are included in the category of project characteristics: educational method, scope of change, and implementation strategies. Variations in educational method were found to be of little importance. Two aspects related to the scope of change were found to impact upon the likelihood of successful continuation: project goals, and teacher change. Implementation problems were generated by staff uncertainty of the intent of project goals, and contributed to the "project demise once federal funding ended" (Berman et al., 1977, Vol. 7, p. 71). Implementation strategies that enhanced implementation and heightened the chances for continuation included: high quality teacher

training, staff support activities providing assistance and feedback to teachers, and teacher participation in decision-making.

The category of institutional setting includes the factors of organizational climate and leadership, school characteristics, and teacher characteristics. On page xi of Volume 7, Berman et al. summarize major findings related to these factors:

> Effective implementation required a good project director and a supportive school principal.
>
> The quality of working relationships strongly affected the percentage of goals achieved and project continuation.
>
> The type of school had little or no relationship to project outcomes or continuation.
>
> Teacher's sense of efficacy emerged as a powerful explanatory variable . . . Teacher's years of experience had a consistent negative relationship to project outcomes . . . Teacher's verbal ability was positively associated with student performance, but otherwise did not affect implementation, teacher change, or continuation.

In determining and describing project continuation once federal funds were withdrawn, the Rand study initially looked for institutionalization of a project. This was defined as integration of assimilation by teachers and incorporation by the schools and district. The authors report that "a minority of projects . . . became institutionalized." However, two other patterns of continuation are reported: isolation, and pro forma. In isolation, a school, usually without funds, continued as best it could. In the pro forma pattern the LEA "formally decided to continue the project but teachers did not use project-related

activities in their classrooms." Berman et al. suggest that lack of teacher assimilation of project-related activities in the latter pattern was due to previous administrative behaviors and activities, such as poor implementation strategies, characterized by lack of district support and lack of invited principal and teacher participation in decision-making.

This study is of interest for many reasons, but two appear to be of primary importance: (1) the study initiated the perspective of mutual adaptation allowing for change in the innovation and in the organization, and (2) the Local Process of Change model was developed and refined during the study.

A precise comparison of each of the seven studies reviewed here against the six models of change described earlier reveals that exact fit or match does not occur. However, the fit may be considered close enough to view each study as an illustrative example of its respective model, and the differences among the studies may serve to highlight the differences among models.

Examination of the findings of the studies indicates areas of similarity. Therefore, the following part of this paper presents a synthesis of findings across the seven studies reviewed and others, and presents the synthesis in terms of processes, influences, and effects so that findings may be viewed in relationship to these dimensions used in the descriptions of the models of change.

Cross-Study Synthesis of Findings

This part of the paper presents a synthesis of findings from the studies discussed above and of findings from three other sources, namely, Emrick and Peterson (1978), Fullan and Pomfret (1977), and Kritek (1976). Emrick and Peterson review five major studies and synthesize the findings. Fullan and Pomfret review fifteen studies, discuss others, and present conclusions based on their review. Kritek reviews the literature and discusses lessons learned about implementation.

Each set of findings is necessarily influenced by such factors as the nature of the innovation* and the assumptions made by the developers and evaluators. However, in spite of such differences, it is possible to attempt to synthesize the findings across the studies and reviews, and it is considered desirable to include a relatively large number of studies in order to present as comprehensive a picture as possible.

The synthesis of findings is organized under two general headings: processes and influences. Processes include activities such as implementation strategies, and communication patterns. Influences include roles and responsibilities of internal and external groups, and the characteristics of the innovation. Findings are generalized, and are presented in the form of directives for the sake of brevity, clarity, and consistency.

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*See pages 10 and 13.

Processes

The activities and patterns of communication discussed here are not those which are an inherent part of the innovation, but rather are those which relate to the planning and operationalization of the innovation. These activities and communication modes are frequently referred to in the literature as strategies of implementation. Strategies used to introduce and facilitate the on-going success of an innovation may be designed by the source of innovation, by an LEA, a school, or an external change agent. Findings of studies and arguments of researchers indicate that all strategies given here are of great importance to successful implementation and continuation, and that quality is more important than quantity.

- Conduct training activities for users, including demonstrations and experiential learning, and providing psychological reinforcement.
- Provide for resource support, allowing time for users to prepare, plan, communicate with each other, collect materials, and reorganize the school schedule if necessary.
- Provide for administrative support, involving principals in relevant activities, and requiring district approval and commitment.
- Provide for feedback, preferably through frequent and regular meetings of users (and others), to address problems, clarify roles and responsibilities, and provide moral support.
- Allow for active participation of users in decision-making whenever feasible.

Influences

There are three influential factors--the internal group, the external group or change agent, and the innovation--all of which are interrelated. The characteristics of each factor, and the decisions and activities of each group or individual can influence implementation and continuation either positively or negatively. It appears that all directives presented below should be considered; positive impact is achieved through a complex interaction of influences.

Internal characteristics. The directives stated here could be addressed by an external change agent, but probably should be addressed by members of the Local Education Agency considering implementation of an innovation.

- Consider motivation; accept and/or adapt an innovation only if it solves a problem which is locally recognized.
- Generate support and active commitment of superintendents, principals, and teachers.
- Since secondary schools have been found to be more resistant to change than elementary schools, be prepared to make extra efforts with secondary school staff.
- Pay attention to teacher needs and characteristics, encouraging professional growth and facilitating communication between and among teachers and administrators.

External characteristics. Fullan and Pomfret (1977) consider factors of design, evaluation, and incentives as influential in successful implementation. However, they present little hard data to support their argument. Other researchers focus on the roles and responsibilities of

the external change agent, variously titled consultant, linker, intermediary, and so on. The role may vary from a person who informally invites another to visit a classroom where an innovation is being implemented, to a person formally involved in stimulating educational change at many sites. However, whatever the change agent's title, or the extent of his or her responsibilities, certain directives based on research findings are of importance.

- Make use of existing personal referral networks and informal communication channels.
- Use face-to-face communication accompanied by appropriate materials.
- Become familiar with the organizational system and its components.
- Secure prior informed concurrence of all levels of the organization.
- After securing informed concurrence, begin activities at the level closest to the operational group.
- Make use of all relevant and available human and material resources internal and external to the system as necessary and feasible.
- Ensure that all transactions are coherent and congruent with the project goals.
- Provide for choice among appropriate alternatives along dimensions such as process, style, and degree of involvement by the target group.
- Do not overcommit personal resources such as energy and time.
- If conducting training activities, make use of concrete experiences, assignments, and materials.
- Follow through with frequent and regular meetings.
- Do not attempt to mandate specific changes.

Characteristics of the innovation. Regardless of the source of the innovation or whether or not it is locally modified, the following directives are important to success:

- Present all relevant information clearly and completely.
- Avoid ambiguity.
- Provide appropriate high quality materials or state ways in which materials can be obtained.
- Avoid organizational complexity.
- Clearly explain new teaching strategies and/or role relationships.
- Provide for clarification and reinforcement through implementation strategies.

Conclusions

The foregoing synthesis of findings indicates a perspective of particular interest to those advocating a stronger liaison between R&D and practitioners: the practitioners--their motives, decisions, and actions--are the strongest influential force in the process of change. While this conclusion may appear to be self-evident, it is nonetheless of major importance to external groups and individuals involved since, if the conclusion is accepted, it may well influence research and development activities, federal and state funding, and attitudes and actions of change agents.

In addition to this pervading perspective, there are two other conclusions that may be made: (1) planning and the use of appropriate

processes are essential to the success of an innovation, and (2) evaluation of implementation, i.e., measurement of generalizable effects, varies across studies, and design and method appear to be still evolving (See also pp. 9-13).

The remainder of this section of the paper explores barriers and facilitators affecting the innovation and its implementation, and the roles and responsibilities of those involved in educational change, drawing not only on the literature cited in the foregoing discussions of studies and their findings, but also on additional literature.

Barriers and Facilitators Influencing Innovations

Barriers

Four major barriers to successful implementation are fairly commonly found embedded in the innovation itself. These barriers relate to complexity, resources, user understanding, and user role. The barriers are caused by the innovation and its requirements, and are not the result of lack of ability on the part of the primary users of the innovation (e.g., teachers).

Complexity. If an innovation requires involvement and/or integration of several components of an organization--for instance, involvement of several schools, or integrated schedules and activities of several curricular subjects within a school--it is considered to be complex. The more components of an organization involved, the more complex the reform, which leads to greater difficulty of implementation (Kirst, Note 4).

Resources. If the innovation requires the use of human or material resources, and does not provide them, difficulties arise. The assumption that necessary resources are readily available and that users will identify, select, and use those resources creates a barrier to success (Gross et al., 1971, pp. 135-139; Kritek, 1976).

Understanding. Lack of understanding may relate to one or more of the following: the innovation as a whole, the goals of the innovation, and the roles required of the user. The barrier of lack of understanding is fairly common, whether or not technical assistance is provided, but is usually more severe when assistance and/or training are absent. Since many innovations are designed externally and are evaluated in a "hands-off" situation, once the barrier of lack of understanding exists it is difficult to remove. The responsibility to clarify, explain, present rationally, illustrate, and persuade, so that ambiguity is avoided, rests with the source of innovation. When the barrier is not overcome, severe implementation problems result (Gross et al., 1971, pp. 150-159; Kritek, 1976; Pincus, 1974; Ruff & Roberts, Note 8).

Roles. If the innovation requires the user to play a new role, or to play several different roles, even when the user understands what is to be done, he or she may suffer from role overload. This means that the user cannot cope with the behavioral change and/or cannot manage the multiple roles, each of which may relate to a different set of tasks. This barrier is especially severe when the innovation consists of written materials without provision for facilitating processes or training (Kritek, 1976; Ruff & Roberts, Note 8).

Facilitators

When the barriers are surmounted by careful design, quality materials, and assistance for all components of the innovation, implementation can be highly successful (Charters & Jones, 1975; Morrish, 1976, pp. 120-122). However, even when an innovation has built-in processes to facilitate its use, it is usually desirable and/or necessary to employ additional planning/implementation processes for effective site-specific operationalization.

Barriers and Facilitators Influencing Implementation

Several assumptions influence this part of the paper: (1) regardless of the model of change used, innovations are likely to be adapted by schools or local education agencies; (2) successful and appropriate adaptation (or development) of an innovation requires planning and operationalization of on-going activities before and during implementation; and (3) the planning/implementing process should be guided by an awareness of related barriers and facilitators.

Miles (Note 5) argues that planning and implementation cannot and should not be separated. His argument appears to be supported, since many suggestions for implementation strategies begin at, or even before, the planning stage. Analysis of the literature indicates that this integration of planning and implementation (P/I) requires recognition of barriers and facilitators, and consideration, selection, and/or application of appropriate constraints and opportunities, strategic principles, processes, and techniques.

In this part of the paper, barriers, facilitators and some generalizations relating to the P/I process are presented under four headings: (1) constraints and opportunities, (2) strategic principles, (3) process variables, and (4) tools and techniques. In each case, discussion is somewhat general, and it should be understood that decisions and actions taken by an internal group are likely to be affected by additional specific local considerations.

Constraints and Opportunities

The constraints and opportunities referred to here are those relating to P/I that should be considered when deciding upon the strategic principles to be applied, processes to be employed, and tools and techniques to be used. These constraints and opportunities relate to perspectives, resources, and current social and educational pressures.

The perspectives, or points of view, for planning/implementation may be influenced by the priorities of external and internal groups and individuals, and by a variety of factors and criteria, such as the nature of the innovation, and its perceived desirability and feasibility. Constraints and opportunities related to perspectives will vary from site to site. Examples of perspectives to be explored include: (1) promotion of mutual adaptation and/or the fidelity perspective; (2) the extent of local development, or modification, of materials or processes; (3) the extent and nature of involvement by various individuals and groups, such as teachers, parents, local or state administrators, and external consultants; (4) the short-term and long-term goals and priorities of the

school system; and (5) the nature and extent of staff development activities directly related to the planning/implementation of the proposed innovation or project.

In addition to the consideration of perspectives, factors of available time, money, and other resources may influence the perceived desirability or feasibility of a given course of action. It is necessary to recognize resource constraints and to anticipate problems that may arise through the impact of external demands. For instance, in the rural experimental schools projects, the federal funding agency specified that planning/implementation should include district-wide (rather than school site) change activities and community participation. These were perceived as inappropriate for local circumstances and difficult to carry out (Kirst, Note 4).

Finally, there are constraints and opportunities of currently popular or accepted objectives, attitudes, or social pressures, such as the present trend to encourage influencial participation of all levels of an organization in almost all planning and decision-making activities.

Constraints and opportunities of perspectives, resources and social pressures at a given site for a given innovation or proposed change, interact with each other and influence not only decisions made at the very beginning of the P/I process, but also on-going decisions and activities. Therefore, site-specific constraints and opportunities should be identified before substantial commitment is made, and subsequent planning/implementation activities should be as realistic possible.

Strategic Principles

Three strategic principles of the P/I process appear to be strongly influential to the success of the innovation: planning, support, and training or assistance. Table 5 presents barriers and facilitators for each of these three strategic principles.

Planning. Usually, planning is perceived as an effort that precedes activation of a project. However, there is evidence to suggest that planning should be continuous or cyclical so that unanticipated problems can be dealt with as they arise, and improvements or modifications can be made on an on-going basis (Firestone, 1977; Heathers et al., 1977; Moore et al., 1977).

Quality planning with optimal use of time and other resources facilitates implementation (Berman et al., 1977, Vol. 7; Gross et al., 1971; Kritek, 1976; Pincus, 1974; Kirst, Note 4). Heathers et al. (1977, pp. 3-1-1--3-1-6) advocate three principles affecting planning: (1) base efforts toward change on the presence of dissatisfaction (or wish for improvement) within the organization; (2) employ a "consumer-centered" rather than a "product-centered" approach in deciding what changes should be made; and (3) in planning and conducting local change programs, share leadership responsibilities with outside experts. Pincus (1974) and Short (1973) advocate collaboration between R&D agencies and educational leadership networks to facilitate practitioner use of relevant research.

Table 5

Facilitators and Barriers of
Planning, Support, and Training and Assistance

Planning		Support		Training and Assistance	
Facilitators	Barriers	Facilitators	Barriers	Facilitators	Barriers
• good use of time • good use of resources • local need basis • consumer-centered approach • shared leadership • R&D and practitioner collaboration	• short-term perspective • organizational weakness • poor timing • poor internal/external communication • internal and internal/external conflict of interest • poor external understanding of internal circumstances	• central office support to "bottom-up" change • administrative acceptance/approval of project goals • good working relationships • commitment of resources • provision for training and assistance • visits and feedback to teachers	• perceived need for stability • perceptions of threat or vulnerability • inertia • cutbacks and delays in funding • too few visits to local sites	• incremental implementation • school site is unit of change • allowance for teacher differences • accountability and feedback mutually determined	• conflicting internal and external interests • imposition from above of "standard packages"

Agreeing that planning prior to implementation is essential, Goodwin (1977, p. 115) identifies three barriers to success: (1) the short-term perspective of school staff, (2) organizational weakness of school planners, and (3) failure of the planning process to culminate at a time when decisions can be made. The implication is that these barriers must be overcome if planning is to be successful. The barrier of organizational weakness is implied by Firestone (1977), who states that internal conflicting interests, illustrated by teachers' loss of enthusiasm in planning due to tight central control, create a barrier difficult to overcome. The issue of organization relates to leadership, which Heathers et al. (1977) suggest should be shared between internal and external groups. Both Firestone (1977) and Kirst (Note 4) point to barriers that are created when the internal and external groups have conflicting interests and when communication and understanding between the two groups are inadequate.

Support. Studies indicate that support ranges from a rather disinterested acceptance of an innovation, which may result in minimal implementation, to a strong active commitment of all individuals and groups, leading to effective implementation (Berman et al., 1977, Vol. 7; Corwin, 1975; Firestone, 1977).

If central office support is given so that schools can implement "bottom-up" changes, implementation is facilitated (Gross et al., 1971; Kritek, 1976; Kirst, Note 4). The Rand study indicates that effective support--from district personnel and school principals--includes moral

support illustrated by acceptance and approval of the innovation and its goals, reinforcement and enthusiasm toward teachers putting classroom improvements into practice, and establishment of good working relationships between and among individuals and groups involved in the project. Practical support is illustrated by real commitment of resources, provisions for training and on-going assistance, and classroom visits followed by constructive feedback.

Barriers to LEA support include the perceived need for stability, personal or institutional perceptions of threat or vulnerability, and inertia (Pincus, 1974). When an external agency is involved, it can create barriers to support, especially if the agency controls funds necessary to effective implementation. Kirst (Note 4) states that the changing policies of a federal agency led to cut-backs and delays in funding, which meant that LEAs were unable to purchase needed materials or carry out training activities according to schedule, thus curtailing their planned support activities. In addition, Kirst (Note 4) states that the support activities of the federal agency--"procedures of project monitors, very brief visits to local sites, and periodic reports and renewal grants"--were insufficient to reorient local behavior toward "comprehensive change."

Training and assistance. Both training and assistance are usually for the benefit of the primary user, e.g., the teacher, and may include general information about the project, specific information and training directly related to the purpose and use of the innovation, and desirable outcomes and how those outcomes are to be measured.

LEA provision for in-service training and assistance is a strong facilitator (Berman et al., 1977, Vol. 7; Gross et al., 1971; Kritek, 1976; Kirst, Note 4). Four considerations may positively influence training and subsequent implementation of the innovation: (1) planning for incremental implementation reduces risks (Goodwin, 1977, p. 116; Heathers et al., 1977, p. 3-1-5); (2) the school site, and not the district, is stressed as the optimal unit of change (Kirst, Note 4); (3) allowance is made for differences in teaching style (Kirst, Note 4); and (4) accountability criteria and provision for feedback are determined through involvement of principals, teachers, and sometimes parents (Fullan & Pomfret, 1977; Kritek, 1976; Kirst, Note 4).

Two barriers must be overcome: the conflicting interests of external and internal individuals and groups (Firestone, 1977), and the belief that reforms can be put into standard packages and imposed from above (Kirst, Note 4).

Process Variables

Throughout the P/I process, three variables have a strong influence on the nature and success of all activities: participation, communication, and motivation. These three process variables are strongly interrelated and appear to be of equal importance in determining the future of an innovative project. Table 6 summarizes the barriers and facilitators for each of the three variables discussed below.

Participation. There is a great difference between passive participation, when an individual is physically present but contributes little,

Table 6

Barriers and Facilitators o
Participation, Communication, and Motivation

Participation		Communication		Motivation	
Facilitators	Barriers	Facilitators	Barriers	Facilitators	Barriers
• Inclusion of administrators, teachers, and parents • Shared decision-making	• Participation without influence • Negative attitude of administrators to teachers • Insufficient time for teacher participation • Teachers' lack of planning skills • Teachers' unfamiliarity with procedures	• Use of strategies to reduce conflict, reduce negative impact of rank and status, and increase communication • Mutual sense of "belonging"	• Internal cross-level differences--"top down" imposition, lack of confidence of lower organization members, use of language inappropriate for audience, perceived conflict of interest • Lack of communication from sponsor of innovation to user	• Problem-solving orientation • Principals' approval • Teachers' sense of achievement, recognition for accomplishment, challenging work, increased responsibility, professional growth, incentive by inservice credit	• Opportunistic orientation • Principals' disapproval • Incentive by threat of punishment

and active participation, when an individual can and does influence the course of events. This difference must be recognized by those involved in the P/I process because the choice between active and passive participation, once made, is difficult to reverse, and because decisions as to who participates and how will affect not only P/I, but also the future of the project.

Many writers agree that participation of individuals and groups from all three levels or units of adoption is essential to successful implementation (Berman et al., 1977, Vol. 7, p. 81; Firestone, 1977; Goodwin, 1977, p. 117; Heathers et al., 1977, p. 3-1-3; Morrish, 1976, p. 129). Specifically, all categories of those involved, including parents or community members as well as district and school staff, should participate in making choices and decisions about allocation of resources, selection of sites, staff and target groups, project governance, staff development activities, development of materials, and evaluation procedures. Shared decision-making is of great importance, especially for teachers. When teachers do, in fact, influence decisions and activities, positive results are achieved (Firestone, 1977).

Firestone (1977) and Heathers (1972) identify an immense barrier frequently created by the fact that teacher participation is without influence. When teachers are invited to participate but find their suggestions ignored, they resist the project, and sometimes sabotage it. Firestone strongly advocates exclusion of teachers if school and district administrators insist on imposing their ideas, although ideally he believes that administrators should change their attitudes and behavior

toward teachers. Firestone states that teachers are at a disadvantage because the school system allows them insufficient time for useful participation, and because they are often unfamiliar with standard operating procedures and skills required in planning activities.

Communication. Some of the barriers to useful and influential participation may be overcome through the use of strategies and techniques of communication.

Morrish (1976, p. 129) argues that facilitating strategies should increase communication, decrease conflict, and reduce the negative impact of rank and status. Margerison (1973, p. 81) states that people exerting influence for change and people to be changed must have a strong sense of belonging to the same group.

Barriers to communication, especially between hierarchical levels of the educational organization, are found to be highly influential (Hall & Alford, 1976, p. 44; Kirst, Note 4). Specifically, these cross-level differences include: (1) the impact of rank and status--illustrated by "top-down" imposition of ideas or an authoritarian style of operation, and by lack of confidence of members of lower organizational levels; (2) style or use of language, e.g., academic terminology vs. the language of the classroom; and (3) perceived conflicts of interest among groups which may or may not be accurate. Pincus (1974), Firestone (1977), and Kirst (Note 4) state that lack of communication between sponsors of innovations and the potential users creates a barrier resulting in lack of understanding with the probable result of inappropriate implementation.

Motivation. Both communication and participation are influenced by factors of motivation or the nature of incentives offered to those involved in the project.

Berman et al. (1977, Vol. 7, p. 23) found that a problem-solving orientation at the district level facilitated implementation and positively influenced later institutionalization of the innovation. In other words, when LEA administrators believe that the innovation meets local needs, they are motivated to provide active support. In the same study, it is reported that principals facilitate implementation when they perceive the innovation as an aid to fulfilling a school need, and when it is congruent with their own philosophy.

Although the motivation of administrators is important, the motivation of the teachers can be even more influential in the day-to-day implementation, and in the degree of involved commitment generated prior to implementation. Margerison (1973, p. 56) identifies five motivating factors: sense of achievement, recognition for accomplishment, challenging work, increased responsibility, and professional growth and development. Berman et al. (1977, Vol. 7, p. 82) support Margerison's findings and state that motivation can be facilitated if teachers are convinced of the educational promise of the innovation. Firestone (1977) elaborates further by pointing out that teachers think in terms of their own students, implying that strategies should be responsive to this perspective. In order to achieve high teacher motivation, the incentive system needs to be restructured (Berman et al., 1977, Vol. 7, p. 83;

Fullan & Pomfret, 1977; Pincus, 1974). In the state of Delaware, and elsewhere, incentives--in addition to the motivating factors identified by Margerison--take the form of in-service credit. This credit is applied in two directions: toward salary increments, and toward university degree course credits. This form of incentive appears to facilitate teacher motivation and useful participation.

When opportunism motivates acceptance of an innovation, barriers are created since administrators demonstrate little interest or support. When principals are unconvinced of the value of an innovation, their negative attitude is felt by the teachers so that implementation suffers (Berman et al., 1977, Vol. 7, p. 124). Some incentives offered to teachers may create barriers. Kirst (Note 4) reports an instance where restructuring took the form of a reverse incentive; teachers were threatened with loss of tenure or lack of promotion. The result was nonimplementation. Incentives of money--hourly pay for attendence at planning or inservice training sessions--are inadequate (Berman et al., 1977, Vol. 7, p. 83).

Techniques and Tools

Earlier in this paper reference was made to the many disciplines that influence educational change. Each of those disciplines offers tools and techniques that may be of use in designing implementation strategies. Relatively few can be included here. Those which are included fall into two categories: group processes, and idea generation and planning techniques. Group processes are included because

of the concern expressed in the literature about effective participation and communication. Idea generation and planning techniques are included because the literature suggests weaknesses in these areas in local education organizations, and because relatively few writers on educational change discuss these techniques. In both cases, facilitating techniques are suggested; they are summarized in Table 7. For the sake of brevity, illustrative examples are used; the complete range of alternatives is not included.

Group processes. The literature on group processes is growing. Citations used here are representative in that there is widespread agreement on statements presented; and are selective in that all references are based on results of studies of group process.

"Group decisions which have been arrived at interactively elicit more solid support and issue into action more frequently than do those which are handed down authoritatively" (Lindzey & Aronson, 1969, p. 261). In order to facilitate productivity and cooperation, two dimensions of the group process need to be understood: task and maintenance. Each dimension requires the application of specific knowledge, skills and attitudes, and both dimensions must be attended to by all group members if the group effort is to be successful (Schmuck & Schmuck, 1971, p. 117). The task dimension relates to the work to be accomplished by the group, and is illustrated by actions such as information-seeking, clarifying or elaborating, summarizing. The maintenance dimension relates to emotions and interpersonal relationships within the group and includes such actions

Table 7

Examples of Facilitating Techniques Useful
for Strategies of Implementation

Group Processes	Idea Generation
• Attention to both task and maintenance dimensions	• Brainstorming
• Training in problem solving and communication skills	• Checklisting
• Perceived influence	• Use of checkerboard
• Efficient routing and ready access to information	• Attribute listing
• Use of feedback	• Scenarios
• Individual and interactive task-relevant decision making	• Decision trees
• Clarity of role	• Simulations
• Democratic and functional leadership	• Delphi
• Groups between 6 and 12 members	• Future wheels
	• Cross-impact matrices

as encouraging, expressing feelings, harmonizing, equalizing opportunities, and compromising or arranging for a "double-win."

Both task and maintenance include the use of communication skills, but in the former it is primarily cognitive while in the latter it is affective. When groups are trained in the use of communication skills, they solve problems more efficiently and have positive feelings about their achievement (McGrath & Altman, 1966, pp. 63-64; Morrish, 1976, p. 129).

The types of roles and the ways in which roles are played within groups are widely discussed in the literature. The leadership role is particularly controversial. There are two basic forms of group leadership: authoritarian and democratic. Lindzey and Aronson (1969, p. 259) report findings of studies comparing these two forms. Authoritarian leadership results in a greater quantity of work, less work motivation, less originality, a greater amount of agressiveness expressed toward the leader and other group members, more suppressed discontent, more dependent and submissive behavior, less friendliness within the group, and less "group-mindedness." These results suggest that authoritarian leadership can be a barrier to useful teacher participation. Smith (1965, p. 139) suggests that the acts of leadership, which may be performed by more than one person, are important to the successful accomplishment of the task. He is supported by Margerison (1973, p. 127), who points out that the concept of functional leadership, in which any member may perform acts of leadership for a short time, allows the emergence of specialized knowledge and skills as needed.

It is essential that all participants contribute toward the successful accomplishment of the task (e.g., Smith, 1965, p. 126). In some instances it is necessary for each member to carry a role, such as recorder, researcher, public relations officer, or inter-group liaison, but when members understand the dimensions of the group process and perceive themselves as useful participants, formal roles are not as important.

The optimal size of a productive group is another somewhat controversial area. In general, however, there is agreement on certain considerations. The larger the group, the less individual talking and acting time there is, and the greater the complexity of relationships. Very small groups--less than four members--are less creative than larger groups (Renzulli, Owen, & Callahan, 1974). Twelve person groups facilitate creativity. Groups with more than 15 members are too cumbersome for effective task accomplishment. Six-person groups can be productive and effective on both group process dimensions.

Idea generation. The literature on creativity is most helpful in this area. Four techniques and one process are of particular interest: the techniques of brainstorming, checklisting, attribute listing and use of the checkerboard; and the process of synectics. The four techniques--when accurately understood and appropriately used--are relatively easy to master, and facilitate the three key dimensions of creativity--fluency, flexibility, and originality.

Brainstorming facilitates participation of all group members; checklisting stimulates flexibility; the use of an attribute list, or a checkerboard helps to ensure that a wide variety of alternatives is covered (Davis & Scott, 1971). The synectics process (Gordon, 1961) is much more complex than the techniques described above. Although it has been used successfully in high schools and in industry, the process is somewhat time-consuming and training is needed to master the methods. Used by a person or group unfamiliar with the methods, the process could prove a barrier to productivity.

In addition to techniques originating from the science (or art) of creativity, techniques used in futurism may also facilitate the P/I process. Miles (Note 5) expresses dismay that such techniques are not so used, stating that they are appropriate for managing uncertainty and complexity, and wondering whether their lack of use is due to disinterest or ignorance. Specifically, Miles advocates the use of scenarios (popularized by Kahn and his associates at the Hudson Institute), decision-trees, cross-impact matrices, and simulations. These and other tools and techniques used by futurists are described by Heathers et al (1977). The same authors explain how a Delphi may be used as a survey instrument, and how future wheels may be used to determine needs and consequences of an innovation.

Needless to say, there are many more tools and techniques that could be usefully applied in planning/implementation. It is hoped that the examples presented above, from the disciplines of futurism, creativity, and behavioral science, may serve to illustrate the richness and variety available from many different sources.

Roles and Responsibilities of Internal Individuals and Groups Involved in Educational Change

There are two major groups commonly involved in educational change: those external to the educational organization experiencing or implementing the change, and those internal to the educational organization. This part of the paper focuses on the internal group; external groups are discussed later.

The internal group usually includes at least three subgroups: the primary users, secondary users or units of adoption, and the tertiary users. Most commonly these three internal subgroups consist respectively of teachers, principals and other school administrators, and district administrators. Thus, the internal group consists of individuals within a local education agency (LEA), who actually experience the change process.

The roles and responsibilities traditionally held by external and internal individuals and groups influence attitudes and behaviors toward an innovation and toward people involved in the planning/implementation of an innovation. Also, the commonly held roles and responsibilities may be influenced by the innovation and/or by the strategies used to accomplish successful planning/implementation.

It is essential that those involved in educational change understand the structure of both internal and external groups, understand the nature and extent of influence of traditional roles and responsibilities, anticipate changes that may occur in the nature of roles and responsibilities, and are aware that problems may arise as the changes are made.

Most of the recent literature on implementation of innovations appears to be based on two assumptions: that the local education agency (LEA) will be heavily involved in the process; and that the perspective of mutual adaptation will influence the process. A third assumption is frequently implied, namely that an external agency may also be involved or be influential. These assumptions necessarily affect the findings and opinions relating to the roles and responsibilities of internal groups and individuals.

The discussion of internal roles and responsibilities is organized under four headings: practitioners in general, the local education agency, the principal, and teachers. Table 8 summarizes the roles and responsibilities of individuals and groups in the internal organization. Items are included only if they are based on the results of studies or are agreed upon by two or more "experts."

Practitioners in General

Some of the literature groups teachers, school administrators, and LEA staff together, frequently referring to these three levels of the internal organization as "educational practitioners." Therefore, the discussion of internal roles and responsibilities begins with generalized statements.

Maguire (1970) identifies four general responsibilities, for practitioners: (1) the need to overcome conceptual confusion, often caused by researchers and developers, (see also Pincus, 1974); (2) the need to

Table 8

Roles and Responsibilities of
Individuals and Groups in the Internal Organization

General Practitioners	LEA	Principals	Teachers
• Overcome conceptual confusion • Define meaningful goals • Develop attitudes supportive of the change project • Be willing to take risks • Be willing to adapt an innovation to local needs • Be continually aware of local needs	• Accept leadership role • Recognize the power of administrative influence • Build coalitions to promote steady progress • Hold cross-level meetings • Arrange for linkage with external resources • Use capabilities for leadership, planning, and conflict resolution • Attack barriers of: - goal ambiguity - conflicting interests - early/threatening evaluation • Attempt to overcome barriers of: - routinization - resource rationing - uncertainty - problem definition/solution • Recognize barriers of: - stability/status quo - vulnerability	• Accept "professional" leadership role • "Know" school staff • Bring positive influence to bear • Arrange teacher release time • Use external resources to help teachers • Arrange cross-school staff meetings • Encourage in-school meetings • Demonstrate active support	• Accept responsibility for delivery of innovation • Participate in decision-making • Collaborate with others involved in the change process • Make efforts to understand the innovation • Make the most of opportunities for professional growth • Be prepared to overcome barriers: - isolation - invisibility • Recognize the potential barrier of teacher and student variability

define meaningful goals, (see also Hall & Alford, 1976); (3) the need to structure operational objectives; and (4) the need to agree amongst themselves, and to state problems clearly.

A fifth responsibility--to mobilize support--is implied by a finding reported in the Rand study, and supported by Kritek (1976), which states that effective implementation depends on the receptivity of the institutional setting to change. The dimension of support is referred to by Kirst (Note 4), Pincus (1974), and Charters and Jones (1975), all of whom state that organizational attitudes supporting change facilitate implementation. Pincus identifies two other facilitating factors: organizational structures favoring innovation, and the professionalism of staff.

Three generalizations agreed to by more than 75 percent of the participants of the conference reported by Havelock and Havelock (1973) imply characteristics influencing the roles of practitioners. The generalizations are: (1) willingness to take risks is an important requirement for successful innovation (see also Pincus, 1974); (2) willingness to make an effort to adapt an innovation to the local situation is an important prerequisite to effective utilization; and (3) previous rewarding encounters with new knowledge lead to expectations that future encounters will also be rewarding.

The third generalization is related to awareness, a dimension discussed by Hall and Alford (1976). They discuss the controversy over whether change occurs because of practitioner awareness of a need, or

because of awareness of the existence of an appealing innovation. They conclude that, regardless of which occurs first, awareness of a need is crucial at each stage of planning/implementation.

The Local Education Agency

Administrative influence is extremely powerful in the process of educational change. Many authors agree that local administrators (not only the district superintendent, but also his or her staff) and school principals are the most strongly influential, positively or negatively, in educational change (e.g., Berman et al., 1977, Vol. 7; Chesler, Schmuck & Lippitt, 1975). Brickell (1964, p. 503) suggests that administrators should take the initiative in structuring change. Kirst (Note 4) suggests that administrators should focus on training and staff development to build coalitions to promote steady progress toward specific educational changes. Berman et al. agree and add that arrangements should be made to hold regular and frequent meetings across hierarchical levels during implementation. Hall and Alford (1976, p. 43) point out that the school superintendent has been described as the most important individual in a school district in regard to "the diffusion of innovation because he . . . can readily encompass (the duties) of an internal change agent." However, Hall and Alford (1976, p. 45), citing Miles (1965) state that when an internal member plays the role of a change agent, the role becomes marginal and lacking in objectivity. It is preferable for administrators to arrange for linkage with external resources and to develop and use their capabilities for leadership, planning, and conflict resolution (Hall & Alford, 1976, p. 47).

Certain barriers exist which are functions of LEA decisions and activities or of the educational system. The former, though formidable, can be overcome, but the latter cannot (at present) be overcome easily.

Barriers which can be attacked are goal ambiguity, conflicting goals or competing interests of participating groups, and early or threatening evaluation of the project (Hall & Alford, 1976, p. 48).

Barriers which are extremeley difficult to overcome are those which appear to be created by educational legislation, such as the "constant need to routinize, ration resources, control uncertainties, and define the task to derive satisfactory solutions to the new demands" (Weatherley & Lipsky, 1977).

Barriers created by the educational system, and which appear to be almost impossible to overcome, include: the stability of schools, which restricts the need for and interest in change; and vulnerability due to control and criticism within and around the organization (Hall & Alford, 1976, p. 46, citing Miles, 1965; Pincus, 1974).

It is apparent that district administrators should take the leadership role in educational change, but in order to be effective they must overcome barriers when feasible, and apply appropriate implementation strategies.

The Principal

Lieberman (1977) and others agree that the principal is crucial to innovation. Chesler et al. (1975) report the findings of a study of

nine schools in which data were collected from all staff members. They report that two major factors operate for principals who encourage staff inventiveness: (1) the principal has an accurate perception of the values and skills of his staff, and (2) the staff is aware of the priority the principal places on the improvement of classroom teaching. Chesler et al. (1975, p. 325) identify the characteristics of two kinds of principals. The first accepts the responsibilities implied by the two factors above, and plays what Chesler et al. call a "professional" role.

> They are "professionally" oriented . . . concerned with improving classroom processes, encouraging teacher growth, and continually evaluating pupil learning.

The second kind of principal plays an "administrative" role. These principals are:

> "administratively" oriented . . . concerned primarily with achieving a smoothly running organization, and responsive to the demands of their administrative superiors . . . tend to regard the improvement of classroom practices and a concern with the more abstract purposes of education as luxuries that seem less important than keeping the school running efficiently . . . (Their) teachers are prone to allow organizational demands to precede those of the classroom.

Chesler et al. (p. 326) conclude their report with a series of directives based on their findings and addressed to the principal who accepts the "professional" role, and who wants to implement innovations for school improvement successfully. These directives are summarized here.

- Secure accurate information about staff relations.
- Determine the social pressures brought to bear on teachers, and the teachers' own commitments and values.
- Be sensitive to indications of personal success in relating to staff.
- If findings about staff are perceived as unsatisfactory, either try influencing teachers' priorities and values, or try influencing the peer culture to encourage teachers' desire to support and share practices for improvement.
- Arrange release time for teachers.
- Arrange for consultants to guide teachers to important literature in the field.
- Collaborate with external resource personnel to develop in-service programs.
- Arrange meetings with staff of other schools at which teachers can describe and evaluate new procedures.
- Encourage informal meetings among teachers for the discussion of effective teaching practices.
- Demonstrate personal active support and concern for raising the level of teachers' competence.

Teachers

When the teacher is the primary user, he or she is the focal point of the change process with major responsibility for the delivery of the innovation (Berman, et al., 1977, Vol. 7; Goodwin, 1977, p. 106). However, teachers on their own can exert little overall influence, and are frequently cautious, even in their own domains (Brickell, 1964; Corwin, 1975; Goodwin, 1977, p. 108).

Goodwin's study explores teachers' attitudes to change and their traditional reactions when presented with rules designed to guide their behaviors. He states (p. 108):

> This study suggests that schools respond at points of greatest stress by invoking rules for the behavior of teachers . . . The purpose of the rules is to guide behavior, specify the basis for decision making, and limit the scope of responsibility . . . reduce sources of ambiguity . . . (and to) augment teacher resources in areas of precarious authority.
>
> Frequently, teachers desire more rules, procedures, and specificity of behavior than administrators are willing or able to provide.

Goodwin goes on to state that the findings suggest that teachers expect administrative direction in such areas as discipline and dealing with parents, but that teachers consider rules relating to matters of instruction as infringing on their professional prerogatives. Goodwin concludes that rules may be a useful means of reducing risks perceived by teachers, and advocates the development and application of rules which specify the exact behavior of teachers, confer authority on those who must implement the innovation, limit possible deviation from the objectives, and do not hold teachers accountable for ineffectiveness or unanticipated consequences resulting from the implementation of an innovation.

If such rules as those advocated by Goodwin are mandated by school administrators, it would seem that the influential participation of teachers, found to be a crucial factor in implementation by so many

writers (e.g., Berman et al., 1977, Vol 7; Firestone, 1977), may be negated. However, if rules and/or guidelines are developed through collaboration of teachers and others involved in the change process, they may facilitate successful implementation.

Three traditionally accepted barriers to successful change are discussed by Hall and Alford (1976), citing Miles (1965). The first factor is also considered important by Kirst (Note 4) and Lieberman (1977). The factors are: (1) teacher isolation, which results in low interdependence among teachers and poor communication; (2) teacher "invisibility" which means that each teacher, alone in a classroom, may modify an innovation, and that it is difficult to control such modifications; and (3) teacher and student variability, which means that uniform implementation is difficult (and may or may not be desirable). The first two barriers may be overcome by the use of appropriate implementation strategies, such as the use of feedback and provision for regular and frequent project meetings. Lieberman (1977) advises teachers that collaboration and peer interdependence can reduce isolation and help to improve teaching practices.

In addition to the use of those facilitating strategies, the use of others is implied by findings of the Rand study, and of Goodwin's study. Goodwin states that teachers' degree of acceptance of an innovation is positively influenced by ready understanding and perceived relevance. The Rand study emphasizes the positive influence of teachers' perceptions and opportunities related to professional growth.

Analysis of findings relating to the nature of an innovation, kinds of implementation strategies, and roles and responsibilities of those involved in educational change, indicates that it is essential that teachers become deeply involved in the project and that every effort is made to ensure their positive commitment.

Roles and Responsibilities of External Individuals and Groups Involved in Educational Change

The discussion which follows attempts to answer three questions: (1) What does research say about the impact of large external groups, such as federal and state agencies? (2) What kinds of roles may be played by representatives of external groups? and (3) What kinds of characteristics and activities of change agents are likely to facilitate educational change?

Although state education agencies (SEAs) may be directly involved in local change, they are viewed as external for the purposes of this paper since that is the way they are usually perceived by LEAs. Other external groups are federal agencies, R&D agencies, such as laboratories and centers or universities, and independent consulting, training, or assistance agencies.

There are four situations in which external groups become involved with local groups: (1) an external group may be in a position to mandate a change or aspects of change, such as when a federal or state agency monitors or controls funding for legislated change; (2) external groups or individuals may be imposed upon an LEA by an SEA in the belief

that the external group can help in solving a local problem; (3) external groups may offer products or services and persuade internal groups to use them; and (4) internal groups may ask external groups to become involved in a local change effort.

The term commonly used to describe an external group or individual involved in educational change is "change agent." However, definitions of this term differ with perspective. For instance, Clark and Guba (1967, p. 114), using the RDDA perspective, refer to Bhola and Singh's definition:

> An individual (or group) consciously playing the role of an initiator with respect to an (invention) so that (the invention) may be accepted by another individual or in an organization or group.

Gross et al. (1971, p. 29) state that their review of the literature indicated that this role is generally perceived to be a "strategic variable with respect to successful initiation and implementation . . . involving a change agent and subordinate participation," but they report a "paucity of research evidence to support these propositions."

Federal and State Agencies

The role of initiator is frequently played by federal and state agencies and their representatives. Often, the initiation is triggered by legislation and may be tied to funding. The process commonly begins with origination of an educational change by leaders of educational opinion. In due course, either the change is mandated by federal or state

law, or an external agency offers funding to internal groups willing to effect the educational change. As internal groups begin to plan and implement the change, representatives of the supervisory or funding agency--perceived as initiators--play a variety of roles, including: advocate, monitor, expert consultant, rule maker, and evaluator/funder, amongst others.

When the initiative is the responsibility of a federal agency, problems can and do arise. Kirst (Note 4) reports findings of projects funded and monitored by a federal agency in which the nature of the projects was specified by the agency. He identifies four barriers to success caused by the federal agency: (1) inefficient and inflexible implementation policies, (2) delays in response to local needs, (3) strategic miscalculation to implement comprehensive change at the central rather than the school site level, and (4) ineffective use of community participation. A fifth barrier identified by Kirst (Note 4) is supported by Pincus (1974), namely that of confused and overly ambitious goals presented by the federal agency.

Weatherley and Lipsky (1977) report their findings of the implementation of a policy for special education (known as Chapter 766) mandated by the state, and monitored by the state education agency (SEA). Weatherley and Lipsky identify four factors regarded as "relatively auspicious:"

1. The law was carefully researched, is clear and concise, and contains detailed, unambiguous regulations.

2. Chapter 766 had strong constituent support and became in large measure a consumers' bill . . . Initial development of the regulations proceeded with considerable involvement of citizens.

3. The law provided sufficient resources to increase the bureaucracy's capacity to plan, coordinate, mobilize support for, direct, monitor, and assess implementation.

4. Several oversight and monitoring mechanisms were established prior to the scheduled implementation of Chapter 766.

However, in spite of these auspicious beginnings, problems occurred. "The two year delay in implementation . . . while intended by the legislature for planning and preparation, was not utilized to the full advantage." There was debate over whether or not implementation should be phased, which accompanied by the failure of the legislature to guarantee adequate funding, resulted in postponement. Also, the SEA division of special education--the primary change agent group--lacked planning and management expertise, and was hampered by a commitment to a passive, regulatory role, and an incumbent staff accustomed to a laissez-faire style.

The results of these problems at the state level were felt by districts and schools which developed a variety of coping patterns in an attempt to "contrive their own adjustments to the multiple demands they encountered."

Weatherley and Lipsky conclude that four lessons were learned through the study, and that these lessons should be mastered by those agencies responsible for overseeing the implementation of educational legislation. The lessons relate to: (1) training, (2) service, (3) parental participation, and (4) monitoring.

Training would include careful preparation of local personnel: training for teachers so that they are better prepared and more confident, and training for specialists in consultative skills so that they can communicate with and support teachers and/or parents.

Service would be aimed at helping LEAs to establish, expand, and improve their services, and should include efforts to overcome the barrier of resistance among LEAs to share and exchange ideas and services.

When the law requires parental participation in making decisions affecting students, pressure to comply with professional authority should be counteracted by an external "child advocate."

Monitoring should include analysis of local actions followed by rewards given to those most closely conforming to "preferred public objectives," and discouragement of objectionable practices.

Given the present trend toward local ownership, reported to be crucial to success by the Rand study, and given the federal and state focus on cost-effective widespread efforts for school improvement, a dilemma appears. Nevas (Note 7) discusses this dilemma, focusing on the questions of whether or not state and federal agencies can generate broad innovations and support their implementation without creating barriers to local activities, and, if so, whether or not it is possible "to get locals to listen to and adopt these ideas." Nevas argues that Title IVC and the newly defined Title IVD attempts to resolve the dilemma since it:

goes part way toward enabling feds and states to sponsor exemplary programs and support services that don't distract locals from focusing on their own needs, by moving toward flexible grant programs, coordination of resources at all levels, and removal of regulatory obstacles to coordination.

Table 9 summarizes the barriers, facilitators, and recommendations relating to federal and state roles and responsibilities. For each of the eight barriers identified, there is a related facilitator and/or a recommendation. It is of interest to note that there are indications that federal and state agencies are becoming more flexible in regard to regulations, while simultaneously becoming more systematic in regard to coordination of resources and activities, training and service, and analysis of local needs and actions. If this pattern continues and strengthens, the dilemma (Nevas, Note 7) caused by the apparent conflict between the need for local ownership and the federal and state need for a high benefit-cost ration may gradually be resolved.

Change Agent Roles

The following discussion focuses on the question: What kinds of roles may be played by representatives of external groups? Many specific roles are discussed in the literature, all of which fall under the general role of change agent. The change agent may play each specific role in turn, according to the needs of the internal group, the nature of the contract agreed upon by the internal and external agencies, and the tasks required by the planning/implementation processes used.

Table 9

Barriers, Facilitators, and Recommendations
Relating to Federal and State Roles

Barriers	Facilitators	Recommendations
1. Inefficient and inflexible implementation policies (K)		Shift from categoric l to open programs (N)
2. Delays in response to local needs (K)	Established mechanisms for oversight and monitoring (W&L)	Service activities (W&L) Efficient communication mechanisms (P)
3. Strategic miscalculation to implement comprehensive change at the central rather than school site level (K)	Removal of regulatory obstacles (N)	Training and staff development activities (N; W&L)
4. Ineffective use of community participation (K) Pressure on parents (W&L)	Strong community support (W&L)	Use of "child advocate" (W&L)
5. Confused and overly ambitious goals (P)	Clear unambiguous regulations	Consistency in policies, goals, commitments (K)
6. Inefficient use of planning time (W&L) Insufficient planning capability (W&L)	Provision for SEA: planning (W&L), coordination of resources (W&L;N), mobilization of support (W&L), monitoring/assessment (W&L),	Coordination of resources and activities (N) Inclusion of analysis of local needs and actions (W&L;N)
7. Failure to guarantee adequate funds (W&L)	Flexible funding (N)	Coordinated use of funds (N)
8. Conflict over scheduling (W&L)		

Key: K=Kirst (Note 4); N=Nevas (Note 7); P=Pincus (1974); W&L=Weatherley & Lipsky (1977)

Havelock and Havelock (1973, p. 60) state: "regardless of his formal job title and position, there are four primary ways in which a person can act as a change agent." The four roles are: (1) catalyst, (2) solution giver, (3) process helper, and (4) resource linker. The role of "linker" (without the prefix of "resource" used by Havelock and Havelock) is used in the literature. Other roles include those of monitor and inventor. Each of these roles is discussed in turn. Subsequently, the role of change agent is discussed in more general terms.

Catalyst. The catalyst attempts to overcome internal inertia, prodding and pressuring the system to become less complacent. By upsetting the status quo, the catalyst energizes the problem-solving process and gets things started. Field agents working within the framework of the Social Interaction Model may well be catalysts.

Solution giver. The solution-giver is related to the inventor (see below) and in a sense is an advocate. Familiar with the needs of the internal organization and with the capabilities of his or her own organization, the solution-giver knows when and how to offer a solution and can help in adaptation or modification if necessary. Consultants working within the framework of the Organizational Development Model are usually solution givers.

Process helper. The process-helper teaches the internal organization to recognize and define needs, diagnose problems, set objectives, acquire relevant resources, select or create solutions, adopt and install solutions, and evaluate solutions to determine the extent of their effectiveness in satisfying the needs initially identified. This role is

very close to the present concept of linker. Referred to as a facilitator, the process helper role was dominant in the TAG study (Moore et al., 1977) used to illustrate the Linkage Model.

Resource linker. The resource linker attempts to bring people and/or materials together, to help the internal organization make the best use of resources inside and outside the system. This role is played during the solution seeking or search and retrieval stages of the models of Problem-Solving, Linkage, and Local Process of Change.

Linker. When the term "linker" is used without a prefix or specific definition, it has much wider implications than the "resource linker" described by Havelock and Havelock. As Hall and Alford (1976, p. 41) point out, the "linker role is sometimes a difficult one to define and distinguish." These authors state that a person performing the role may be a member of the internal or the external organization, and is perceived as external to their own group by the primary users of an innovation. An internal linker frequently has other roles--such as administrator, researcher, or evaluator--in addition to the linkage role, so that performance of linking activities becomes marginal. Reference to Havelock and Havelock's discussion of the Linkage Model indicates that ideally the linker role incorporates those of the process helper and the resource linker and gives strong emphasis to the incumbent's ability to simulate internal norms.

Monitor. This role is commonly played by representatives of federal or state agencies and is associated with the Research, Development, Diffusion, Adoption Model (RDDA). The monitor is always an advocate, and

may also be a catalyst, solution giver, resource linker, and inventor. Frequently the monitor is an evaluator, a role which--when combined with that of funding agent--exercises a great deal of influence over the change process.

Inventor. Hall and Alford (1976) identify eleven factors that influence the nature and effectiveness of an innovation, when the source of innovation is a group or agency in the role of change agent. These factors are: (1) the attitudes and knowledge of skills and interests brought to bear on the task; (2) the intelligence, experience, and training of those involved in the project; (3) the openness and cohesiveness of communication within the external group and between internal and external groups; (4) the demographic makeup of the external group; (5) staff motivation for project involvement; (6) the diffusion capability; (7) the research and evaluation capability; (8) the complexity of the external organization of which the task group is part; (9) the centralization of external group to internal groups served; (10) the degree of formalization within the external group and between the external and internal organizations; and (11) the nature of relationships and kinds and degrees of accountability between the external and internal organizations. Inventors or their representatives usually work within the frameworks of the RDDA and Social Interaction Models.

Change agents. In addition to the descriptions specific to the roles discussed above, there are roles and responsibilities which are described in more general terms. These general descriptions usually refer to a

change agent, but recently the term "linker" is also used. In order to avoid confusion, the term "change agent" is used in the following discussion, although some references come from "linkage" literature.

The change agent is considered to be an external individual or group that is not distracted by other responsibilities. The discussion is guided by Firestone's (1977) statement that "an ideal change agent views his task as helping an organization solve its problems and usually expects initial diagnosis to be a collaborative process."

In determining the most appropriate role for a given situation, the change agent should consider five factors (1) the coherence of the role concept, (2) distinctiveness (i.e., the role selected is different from roles played by other individuals involved in the change process), (3) need, (4) feasibility of training, and (5) adoptability of the role (Havelock & Havelock, 1973 p. 62). Role adoptability is discussed in a recent report of a study designed to determine the relationship between individual personalities and the formal role requirements of change agents (Mitroff, Note 6). One implication of this study is "the double bind . . . between what the incumbent can do best and likes to do best and what he thinks he should do." This was illustrated by the fact that personality preference, rather than the role demands, determined individual allocation of time to tasks. In rank order of time spent (and preference), the task categories were (1) interpersonal, (2) planning, (3) routine, and (4) problem-solving--this in spite of the fact that incumbents knew that the role called for a reverse rank order of effort. Mitroff recommends that either the role should be designed to fit the incumbent's

personality, or teams of change agents with complimentary personalities should be formed.

The synthesis of findings of implementation studies presented earlier in this paper listed 12 directives addressed to change agents. Only four of those directives--relating to knowledge of the internal organization, use of resources, recognition of alternatives, and a veto on the imposition of specific changes--are discussed in the general literature about change agents. It may be argued that those interested in the role of change agents are less likely to read reports of studies than they are to read "what the experts say." Therefore, it is useful to examine the opinions of those perceived to be experts. Table 10 presents a synthesis of activities, skills, knowledge, and characteristics necessary for a change agent to be effective. Items are included if they are: (1) based on study findings, or (2) representative of the opinion of at least two experts.*

The most generally agreed upon activity for change agents is the effective and optimal use of available internal and external resources (Crandall, 1977; Lipham, 1977; Havelock & Havelock 1973).

An activity approved by 80 percent of the experts participating in the conference reported by Havelock and Havelock (1973), relates to the concept of synergy. The change agent is advised to present a "variety

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*Havelock and Havelock are treated as a single expert unless the opinion is based upon a minimum of a 75 percent agreement of participants of the conference reported by these authors in 1973. These agreements are also presented in the comparison of change models made earlier in this paper.

Table 10

Responsibilities of a Change Agent

Activities	Skills	Knowledge	Characteristics
• Make optimal use of all resources	• Planning	• Available resources	• Problem-solving orientation
• Do not mandate changes or impose external views	• Evaluation	• Content/subject matter	• Productivity
• Apply the concept of synergy	• Documentation	• Planning/implementation processes/strategies	• Competence
• Overcome resistance to new ideas	• Assessment of internal norms	• Knowledge required to conduct activities	• Cosmopoliteness
• Establish credibility/legitimacy	• Interpersonal communication		• Sense of survival
• Become familiar with the internal system	• Simulation		• Attitudes or attributes necessary to acquire relevant knowledge and skills and to conduct required activities
• Use existing communication networks	• Those skills necessary to conduct required activities		
• Use face-to-face communication plus "hard-copy"			
• "Enter" close to the primary user			
• Secure concurrence of all internal levels			
• Ensure coherence and congruence with goals			
• Provide for alternatives			
• Use concrete experiences, etc.			
• Do not overcommit personal resources			
• Reciprocate and collaborate			
• Listen			
• Focus on user need			

of messages . . . focusing them in combination, in sequence, and in repetition." This concept is like the advice given to a teacher introducing a new skill or some new information; "Use three ways to say what needs to be said three times, put it altogether, then separate the parts and spell it out again." Other change agent activities agreed to be important by at lest 75 percent of the conferees relate to: planning, evaluation, user need focus, need definition, face-to-face communication, simulation, reciprocal feedback, resource collaboration, and listening.

Havelock and Havelock (1973) list three additional action directives for change agents: (1) do not impose external views of problems or solutions on the internal organization; (2) assist and encourage internal groups to define and articulate their needs, problems, and ideas for themselves; and (3) become familiar with the internal organization. This last directive is agreed to by Crandall (1977), who advocates change agent interaction with all levels of the internal organization, and by Paul (1977), who concludes from his synthesis of studies that the effective change agent establishes accurate perceptions and expectations for internal and external organizations. Paul identifies two other change agent actions: (1) overcoming resistance to new ideas, and (2) establishment of personal credibility and legitimacy of project activities.

In addition to having the skills necessary to accomplish the activities described above, the effective change agent should (1) be able to make accurate assessments of the norms of all levels of the internal organization (Crandall, 1977; Havelock & Havelock, 1973; Lieberman, 1977);

(2) have skills in identifying objectives in complex situations, and in recognizing and testing alternatives (Havelock & Havelock, 1973); (3) have skills in planning, evaluation, and documentation (Crandall, 1977; Lieberman, 1977), and be prepared to share and teach those skills (Havelock & Havelock, 1973); and (4) apply skills in interpersonal communication (Crandall, 1977; Lieberman, 1977).

In order to conduct required activities, an effective change agent needs the appropriate knowledge, in particular: (1) familiarity with all resources that may feasibly be used (Crandall, 1977; Havelock & Havelock, 1973; Lipham, 1977); (2) knowledge of the relevant content or subject matter (Crandall, 1977; Lieberman, 1977); and (3) knowledge of planning/implementation processes or strategies and their relative effectiveness (Crandall, 1977; Lieberman, 1977).

Finally, effective change agents are characterized by attitudes or characteristics necessary to acquire relevant knowledge and skills and to conduct required activities. Crandall and Lieberman agree that the following characteristics are important: a sense of survival, a problem-solving orientation, and the willingness and ability to be productive and competent. Havelock and Havelock identify three additional characteristics: a highly developed sense of personal identity, the ability to ask critical questions, and a "cosmopolitan" background which is exemplified by experience in many disciplines and activities. (Cosmopolitness is also agreed to by over 75 percent of the change agents polled by Havelock & Havelock, 1973).

Examination of the multiple requirements of the change agent role indicates that Mitroff's (Note 6) recommendation for teaming may not only be preferable for individual role comfort, but also necessary in order to encompass the array of activities, skills, knowledge, and characteristics considered essential for effective change agents.

SUMMARY AND CONCLUSIONS

The review and synthesis of the selected literature may be summarized as follows:

- Recent research places greater emphasis on the study of the processes and influences of implementation than on the study of program effectiveness as illustrated by student achievement alone.
- Models of change which focus on local needs and which place internal groups in a cooperative or collaborative role are becoming increasingly popular.
- Although research has identified barriers and facilitators affecting planning/implementation principles and processes, and has identified effective tools and techniques, much of this research has not yet been applied.
- It remains to be seen whether groups and individuals will adopt the facilitating roles and responsibilities identified by research.
- Processes of change are presently considered to be of primary importance, that is, both internal and external groups appear to be more concerned with how rather than what.
- The influences of change are exercised by both internal and external groups. One cannot avoid the other; external groups such as federal and state agencies are--in some instances--becoming responsive to internal influence, while internal groups continue to experience the impact of external influence.
- The effects of change are complex and interrelated. Although student performance continues to be meassured--and should always be considered as a major determinant of an innovation's effectiveness--it is now correlated with a number of other effects such as level of use/assimilation, incorporation, stakeholder satisfaction, practitioner capability, and goal congruence of intention and outcomes.

The major findings and recommendations presented in the previous section of this paper have been synthesized and are presented in Tables 11, 12, and 13. All three tables deal with processes--the dominating

dimension of implementation. The processes listed in the three tables should be addressed by external and internal groups, and ought to be addressed by the latter whether or not an external change agent is involved. In each case, facilitators will probably overcome barriers, but in other instances barriers are so strong that facilitators may not totally overcome them. Also, relatively static barriers, such as lack of resources, cannot always be overcome even when the facilitator is known. In each table, items supported by cross-study findings and/or by two or more of the writers cited in this paper are considered to be strong and are identified by an asterisk(*).

Table 11, presenting general processes, includes the dimensions of resources, focus of change, planning, and support. Table 12, presenting communication processes, has no subdivisions, and only the first four facilitators have corresponding barriers. However, the barrier of cross-level conflict could well have a strong negative affect on all facilitators. Table 13, presenting processes for training and assistance, includes two major dimensions: (1) synergy, which means the use of many methods to convey the message; and (2) incentives. In the literature, it is assumed that teachers are to be trained, but these processes could apply equally well to other groups.

If the current emphasis on local ownership continues and strengthens, certain problems must be anticipated. These problems are implied by the barriers listed in Tables 11, 12, and 13. One major problem relates to local resources--not only the availability of material resources such as money and materials, but also of abstract resources such as time and

Table 11

Processes - General

Facilitators	Barriers
Resource coordination*	Insufficient resources*
Optimal use of time & other resources*	Inefficient use of time*
Resource commitment	Resource rationing
Access to resources*	Unavailable resources*
Flexible/coordinated use of funds	Lack of guaranteed funds*
User need focus*	Mandated change*
School site focus	District focus
External/internal collaboration*	Conflicting external/internal interests*
Reciprocal feedback*	Change in external policies
Consistency of policy, commitment	Inefficient/inflexible external policies
External/internal simulation*	Poor external/internal communication*
Ongoing planning*	Short-term perspective
Goal consistency*	Conceptual confusion
Meaningful goals defined*	Goal ambiguity
Operational objectives structured	Confusing/overly ambitious goals
Planning capability	Lack of planning capability*
Agreement on needs/problems*	Conflicting interests
Requirement for task-relevant decisions*	Uncertainty
Mobilization of support*	
- commitment, approval	
- problem solving motivation*	- opportunistic motivation*
- recognition of need*	- stability*
- coalitions built for improvement	- vulnerability*
- use of administrative influence*	- inertia
- community support*	- ineffective community support*
- removal of regulatory obstacles	- "top down" imposition*
- "bottom-up" input	

*"strong" items

Table 12

Processes - Communication

Facilitators	Barriers
Participation by all involved*	Cross-level conflict*
Use of informal networks	Impact of rank & status
Interactive decision making*	Teachers' lack of knowledge, skill
Perceived influence in decisions*	Teachers' lack of influence*
Task-relevant decisions*	
Face-to-face communication*	
Sense of "belonging"	
Role clarity*	
Functional leadership	
Democratic leadership	
Use of task and maintenance skills*	
Capability in conflict resolution	

*"strong" items

Table 13

Processes - Training and Assistance

Facilitators	Barriers
Use of synergy	
- demonstration*	Role confusion*
- experiential learning*	Role overload*
- psychological reinforcement*	Vulnerability*
- face-to-face communication*	Lack of comprehension*
- quality materials/clear information*	
- concrete activities/assignments*	
- feedback mechanisms*	
- regular/frequent in school meetings*	Isolation*
- cross-school meetings	
- mutually agreed assessment measures*	Early/threatening evaluation
- ongoing assessment*	Invisibility
Use of incentives	
- recognition for accomplishment*	Threat of punishment
- inservice credit*	
- perceived achievement*	
- opportunity for professional growth*	
- increased responsibility*	
- allowance for individual differences	Variability
- allowance for release time	Teachers' lack of time

*"strong" items

expertise. When the problem is severe, a school or district may not only lack the material resources to implement an innovation, but also be unable to marshall the abstract resources to facilitate winning assistance available from external agencies. Such a situation indicates that external groups should not only make assistance available--in a variety of forms--but should also attempt to identify and seek out needy districts or schools.

If external groups do, in fact, become involved in local needs analysis across many districts or regions, they in turn will face problems relating to resources and their optimal use. One challenging aspect of the problem of resource allocation and coordination relates to locus of control. If local ownership is given priority, but the innovation is implemented at the expense of an external group, who is responsible for the outcomes, and who is responsible for general and ongoing decisions and policies? At what point, and under what conditions may the internal or the external group terminate the project?

It is beyond the scope of this paper to suggest answers to questions such as those above, or to design a model which enhances facilitators, overcomes barriers, and satisfies both the objective of local ownership and the objective of widespread cost-effective educational improvement. However, the findings of recent studies indicate that greater use can and should be made of research findings, and that collaboration of external and internal groups and coordination of resources are desirable and probably necessary in the design and effective planning/implementation of innovations in educational organization and instruction.

Also, some tentative conclusions may be inferred from the literature:

- In ary planning/implementation effort several key actor groups will be involved e.g., a state or federal agency team, an intermediate group, local planners, school principals and faculty;
- Each key actor group will engage in the same kinds of activities, but not necessarily at the same time nor with the same degree of emphasis;
- Phases of activity are likely to loop, spiral, or run one in support of another at the same time with one or more key actor groups involved.
- The phases of activity suggest a general design:

Identify/modify constraints/opportunities	with provision for appropriate communication participation motivation
Mobilize support	
Engage in planning	
Provide training and assistance	
Implement incrementally by topic, site, population, or component	
Design and conduct monitoring	

- The design suggested should not be perceived as linear, nor should it be expected that a given phase is finite and will be completed before another begins;
- Implementation is a flexible, adaptive complex of processes, subject to human and material influences and likely to produce a variety of effects.

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